

DOW CANADIAN

February 1978

# INSIGHT

EDITION

AR51

## THE CHARGES AGAINST CHEMICALS



- The 2,4,5-T Rumble
- The Additive Scare: What TV Isn't Telling Us
- A Time For Activists



animals under test die) of water varies substantially but is in the range of 500 grams/kg of body weight. Sucrose has an LD<sub>50</sub> of about 60-80 gm/kg, glucose about 20-30 gm/kg and even plain old starch about 200 gm/kg. Corn and cotton seed oil have an LD<sub>50</sub> of about 250-300 gm/kg of body weight. The LD<sub>50</sub> for egg white is about 100 gm/kg and for casein about 1,200 gm/kg. The LD<sub>50</sub> for salt (sodium chloride) is about 3½-4 gm/kg. You may think these figures indicate very low toxicity and they do...although it may interest you to know that a considerable number of pesticides have *lower* acute toxicities than salt and some are no more toxic than glucose.

But the point I really wish to make is that the safety margins for pesticides exceed by a considerable margin the safety margins we enjoy for the least toxic constituents of our food. We consume about 10-40 grams/kg of basic food constituents and water each day, which is about 1/10 to 1/50 of a lethal dose assuming optimistically an LD<sub>50</sub> of 500 gm/kg. We also consume about 0.000002 gm/kg of pesticides each day, which is about 1/50,000th of the average LD<sub>50</sub> of pesticides which is pessimistically assumed to be 0.1 gm/kg. Putting it very simply, the safety margin for pesticides in food is at least 1,000 times greater than for the least toxic constituents of the food you eat.

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### "There's a difference between toxicity and hazard."

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The problem is that neither the news media nor our public agencies are accurately informing the public on the distinction between "toxicity" and "hazard" and the relationship of toxicant concentration to expression of toxicity. The chlorine that kills the germs in our drinking water at concentrations safe to us is the same deadly gas we read about when a chlorine tank truck overturns and ruptures near a populated community. The hazards to workers being drenched daily by Kepone dust in a poorly run chemical plant cannot in any way be extrapolated to suggest similar hazards to the population at large from the small concentrations of Kepone that have been applied in the general environment. The injury to cattle inadvertently fed substantial amounts of PBB cannot be extrapolated to prediction of horrible dangers to breast-fed children because of the infinitesimal amounts of PBB in mother's milk. Who would be foolish enough to predict devastation by a gentle breeze from observing the impact of a hurricane? But that is the kind of prediction being used with many types of agricultural chemicals.

Especially with carcinogens, the viewpoint has been promulgated that there is no safe level and that, therefore, any man-made chemical

shown to be carcinogenic should be banned. What an extraordinary viewpoint considering that we have always been bombarded by a multitude of naturally occurring carcinogens, yet only 20% of us eventually get cancer even though we now live a lot longer and our body's defense systems are more apt to wear out with increasing age.

The human body has marvelous mechanisms for resisting and controlling cancer. The threshold level of carcinogens from all sources required to cause cancer must be very high for most people most of their life and certainly far above their normal exposure to carcinogens. Unfortunately, as we grow old some of us eventually lose our ability to resist the development of cancer and we become part of the chosen 20%. There is no evidence that the massive increase in man-made chemicals in the last 35 years has significantly increased the incidence of cancer. As a matter of fact, except for lung cancer caused principally by the huge increase in cigarette smoking, *the overall age adjusted incidence of cancer in the U.S. has not increased since 1940.*

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### "Cancer related to worker exposure represents about 1% of all cancers."

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It is not my intent to try to persuade you that there are no real toxicological problems with man-made chemicals, especially pesticides. You know better than that. Excessive worker exposure to potent cholinesterase inhibitors has been a significant problem. We are continuing to find new examples of increased cancer incidence in workers grossly exposed for substantial periods of time to carcinogens. But where hygiene has been good and exposure levels minimal, no such increase in incidence occurs. Cancer related to excessive worker exposure, represents about 1% of all cancers.

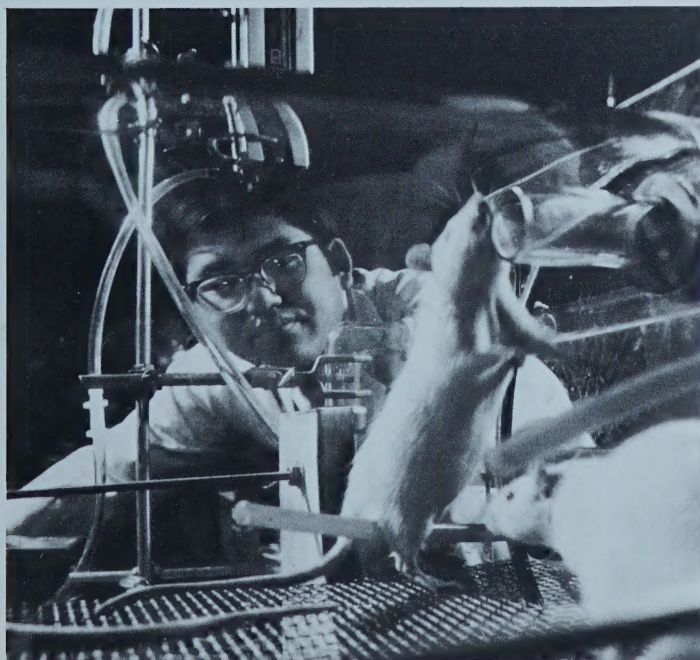


The average amount of residual pesticides in food is far below 1/100th the no-effect level, far less a hazard than some naturally occurring toxins.



Nowhere is there more *potential* danger to workers than from excessive exposure during production or application. Even so, more people are killed each year in the U.S. by such specialized endeavors as sky diving than by pesticides. Most of the 30-50 deaths caused by pesticides are due to suicide or to accidental poisoning of children as a result of carelessness by adults.

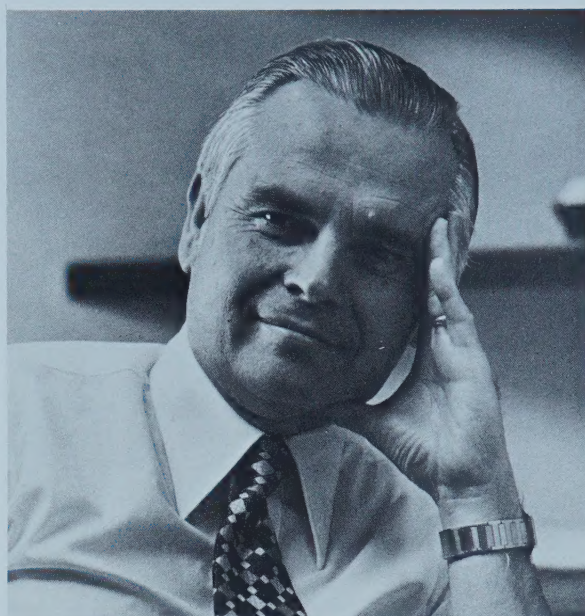
Nor am I trying to persuade you that there are no environmental problems with pesticides. Poor plant effluent and pesticide disposal practices still plague industry. Some types of compounds, in particular some of the chlorinated hydrocarbons, are too persistent and bioconcentrate too much to be suitable for extremely wide use. Personally, I am not a great fan of the chlorinated hydrocarbons and I am happy to see the development of substitute materials. But even the most persistent chlorinated hydrocarbons are uniquely valuable chemical tools and certainly should be used carefully and sparingly when there are no suitable alternatives. Although there is widespread distribution of a few of the more persistent pesticides in the environment in small concentrations, there is no compelling evidence of widespread damage to the environment by pesticides. Measurable damage is usually quite localized when it occurs, and quite transient. Most fish kills are not due to pesticides. An observed decline in birds of prey has been partially attributed to egg-shell thinning by DDT. Nevertheless, the greatest negative effects by far on populations of these birds is attributable to shooting and encroachment of their habitats by humans. The environment takes the use of most pesticides in its stride much as it does a change in the weather.



Innovative research is slowly dying as industry shifts its resources to defense of current products to protect worker's jobs, avoid closing down essential industrial sectors, minimize environmental impact.

Why then do we continue to have such an uproar over pesticides? Most of the people in the private and public sector that are involved with

*Continued on page 18*



Cleve A.I. Goring is a research manager in charge of the Animal Products and Pesticides groups within the Dow Chemical U.S.A. Agricultural Products department, Midland, Mich.

He joined Dow in 1952 as an experimental researcher at the Seal Beach, Calif., Laboratory. While there, he was promoted to project leader in 1956, group leader in 1960 and research supervisor in 1962.

In 1964, he was named assistant director of Dow's Bioproducts Laboratory at the Walnut Creek, Calif., Research Centre. Following a one-year sabbatical in England, Goring was named laboratory director of the Dow U.S.A. Ag-Organics Department at Walnut Creek in 1970.

He was appointed to Dow's Environmental Testing Advisory Board when it was formed in 1971 and to a Dow Herbicide Council formed in 1972.

Goring transferred in 1973 to Dow headquarters in Midland to serve as director of Plant Science Research and Development for Dow U.S.A., with responsibilities for all plant science research in Midland, Walnut Creek, and at Dow field stations in four states. He was named to his current position in September 1976.

Goring was born in 1924 in Georgetown, British Guiana, South America. He holds a 1946 degree in bacteriology from McGill University, Montreal, Quebec; as well as 1947 M.S. and 1950 Ph.D. degrees in soil bacteriology from Iowa State University, Ames, Iowa.





If zero risk were required in the products of all industries, every company manufacturing motor vehicles would be shut down immediately and permanently, all physicians and surgeons would inevitably be deprived of their tools, and most other tools, machinery and chemical agents would be banned.



# The 2,4,5-T Rumble – What Is It All About?

Few herbicides have been as highly praised or thoroughly maligned as 2,4,5-T, nor as thoroughly researched.

The phenoxy herbicides, 2,4-D and 2,4,5-T, which have been widely used for some 25 years, are two of the most highly respected, trusted tools of the farmer and forester. Their use was never seriously challenged until the U.S. forces in Vietnam began defoliating the jungles with Agent Orange, a herbicidal mixture containing 2,4,5-T. Suddenly, in newspapers and magazines and on air, the familiar farm chemical 2,4,5-T was being denounced as a war material, dangerous to man and beast — a destroyer of woodlands and a threat to humanity that probably caused abortions and birth defects, possibly even cancer.

For example, in September 1974, the Moscow correspondent of the Baltimore Sun, after interviewing a North Vietnamese doctor, wrote a scathing denunciation of the herbicide, which began: “While American authorities continue to debate whether the chemical herbicide 2,4,5-T is too deadly to use, hundreds of Vietnamese are developing liver cancer almost certainly as a result of the defoliant’s widespread use in Indo-China for a decade.” *Science* magazine reported that Vietnamese mothers were giving birth to monstrous babies and that many mothers had to be deliberately aborted of the “bundle-like” fetuses to avoid bleeding to death. Many newspapers have carried emotion-charged reports characterizing brush control with 2,4,5-T by the U.S. Forest Service as “biological warfare.”

## Wide but misleading publicity

These charges against 2,4,5-T, and others too numerous to report here, have been given wide publicity. Less well-known are the results of investigations reported in 1975 by a task force created by the Council for Agricultural Science and Technology, a tax-exempt national organization composed of 15 scientific societies related to agriculture and forestry.

The report of this task force offered the following conclusions:

- *“The committee could find no conclusive evidence of association between exposure to herbicides and birth defects in humans.”*
- *“Claims that herbicides have rendered the soil permanently sterile; that is, unfit for any plant growth are not supported by chemical and biological studies of herbicide persistence in the soils of South Vietnam and are contrary to worldwide experience with the herbicides used.”*
- *“The safe and effective use of herbicides on agricultural forest and industrial lands in the United States has been amply demonstrated.”*
- *“The atypical military usage in South Vietnam has no relation to, and no bearing on, the peaceful uses of herbicides in the United States and throughout the world.”*

The National Academy of Sciences, at the request of the Congress also conducted a study on the effect of herbicides in South Vietnam. The committee consisted of 17 scientists from six countries, representing a broad spectrum of disciplines. This committee found no damage to soils. There were herbicide traces in the soil, but not sufficient to retard plant growth. They estimated that cultivated areas on which crops had been destroyed could be replanted within one year. It was also concluded that the death of vegetation has not had lasting effects on plant nutrients within the ecosystem, with the possible exception of potassium. The NAS study group also found no evidence of soil hardening serious enough to render the areas barren. And, in their words, “The Committee could find no conclusive evidence of association between exposure to herbicides and birth defects in humans.”



According to Dr. Boysie E. Day, Professor of Plant Physiology at the University of California, Berkeley, scientists are "in general agreement that 2,4,5-T is a plant killer, not an animal killer." According to Dr. Day, 2,4,5-T has less potential for causing birth defects than such everyday chemicals as aspirin, vitamin A, vitamin C, and common table salt. Speaking at the 27th annual California Weed Council, Dr. Day stated, "After five years of agonizing over 2,4,5-T, the Environmental Protection Agency has withdrawn all proceedings against this compound. The EPA is right about this. They have seen the scientific evidence for this move, but they are taking terrific abuse from uninformed people."

### Huge safety factor

According to Dr. R. G. Harvey, University of Wisconsin agronomist, there is an 8000-fold safety factor in normal use of 2,4,5-T over the amount necessary to cause embryonic effects in rats. If a 130-lb woman ate 3.3 lbs of food every day that contained 0.2 parts per million of 2,4,5-T, her total consumption would be 0.3 mg/day, which is more than 8000 times less than the levels shown to cause birth defects in six animal species, including rats, mice, sheep, and monkeys. The average woman is not likely to encounter the herbicide in her diet in any amount, even occasionally. And if by some rare chance she came into contact with traces of 2,4,5-T, it is unlikely that they would amount to as much as 0.2 parts per million. A survey of food samples collected over a period of 13 years showed only three samples that contained any traces of the herbicide. In those three, the levels were 0.001, 0.008 and 0.19 parts per million. The 8000-fold safety factor is obviously conservative. Referring to silvex or 2,4,5-TP, a relative of 2,4,5-T also containing dioxin, Dr. Harvey stated that the 130-lb woman would have to drink 48,000 gallons a day of the material as applied to get the minimal effect.

Actually 2,4,5-T itself is not a particularly hazardous herbicide. The great controversy rages over the presence of minute traces of a very toxic chemical, 2,3,7,8-tetrachlorodibenzo-p-dioxin, better known as TCDD, or simply dioxin, an impurity formed in the process of manufacturing the herbicide.

In Canada as well as the United States, the maximum permissible level of TCDD in the active ingredient portion of the formulated herbicide is 0.1 parts per million. When the herbicide is manufactured (i.e. "formulated") and packaged for sale, the TCDD concentration is reduced through dilution by at least 50% to about 0.05 ppm. Before use the concentration is further diluted with water or oil to produce the final herbicidal

spray. Depending on the end use, the TCDD content is as little as 1/667th of the original government-specified maximum level.

The average amount of dioxin in Agent Orange, as used by the U.S. Air Force, was approximately 1.91 ppm on a weight basis. We have noted that Agent Orange, which was literally dumped on Vietnam, has not been implicated in any observed cases of cancer or birth defects. Unlike the Air Force chemical, the farm herbicide, 2,4,5-T, is used carefully in limited controlled quantities and in accordance with government-approved label instructions. When used to control weeds and brush on pasture land it safely helps provide an increased food supply to a hungry world.

According to Dr. Philip C. Kearney, Laboratory Chief, Pesticide Degradation Laboratory, Agricultural Environmental Quality Institute at Beltsville, Maryland, whose laboratory received the USDA Superior Service Award in 1974 for dioxin research, science knows the following about dioxin in the environment:

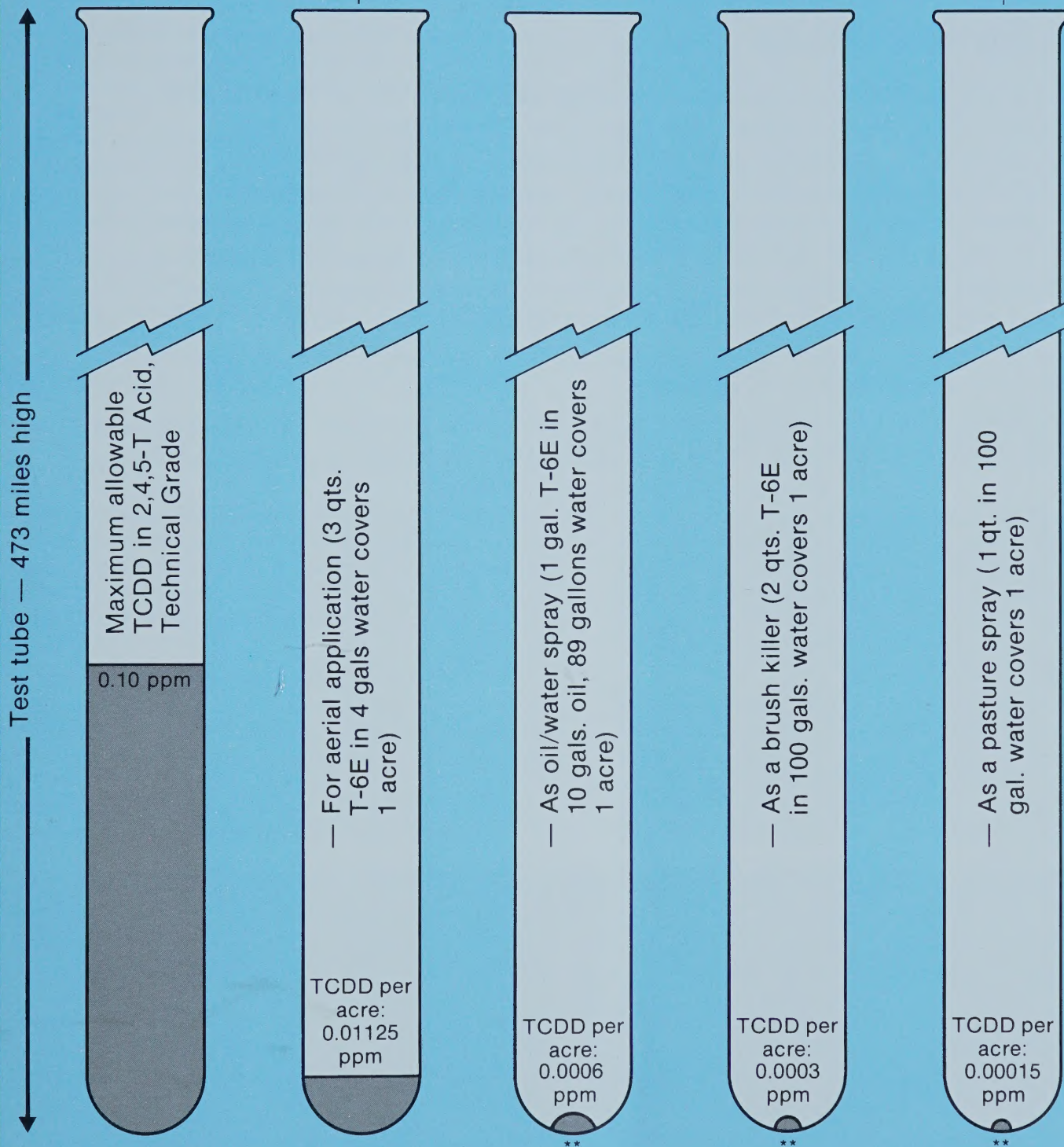
- ☐ "TCDD does not leach vertically in soils"
- ☐ "Significant amounts of TCDD are not taken up by plants and none could be found in harvested grain or soybeans."
- ☐ "TCDD disappears slowly from soils and about half is lost after 1 year. It is less persistent than most chlorinated hydrocarbon insecticides, but more persistent than 2,4,5-T."
- ☐ "TCDD is not translocated from the point of application on the leaf surface to other parts of the plant. Some of it is washed off with rainwater."
- ☐ "TCDD destruction may be caused by sunlight in water, but not on soil surfaces."
- ☐ "TCDD is not made from the breakdown products of 2,4,5-T in soils or in sunlight."
- ☐ "Large amounts of TCDD fed in animals' diet can be eliminated in the urine and feces, although there are some residues in the liver."
- ☐ "TCDD was accumulated from water by fish in laboratory studies. Recent field monitoring data suggests this may not be a problem."

Stated briefly, TCDD (dioxin) is not likely to accumulate in the soil. Moreover, the herbicide, 2,4,5-T, does not create further quantities of dioxin as it decomposes. Most scientists believe (and Dr. Kearney is apparently one of that number) that 2,4,5-T can be used safely with dioxin contents as high as 0.1 part per million, a much higher rate than that found in commercial formulations as they are currently applied. □



## The 473-mile-high test-tube: TCDD per acre sprayed

Application sprays of ESTERON®T-6E herbicide



\*\*Amount shown is visually magnified about 2000 times for graphic visibility.

## HOW MUCH IS A PART PER MILLION ?

"Parts per million (ppm)" and "parts per billion (ppb)" are getting to be common phrases in newspaper and television these days. Unless you are a scientist, few people can comprehend how small a portion these terms really indicate. Perhaps the following analogies will aid understanding.

*One part per million* is equal to 1 ounce of salt in 31 tons of potato chips, for example. Or a very dry martini made with only a single drop of vermouth in 80 "bottles" of gin. Or it's one bad apple among 2000 barrels of good ones. Or one inch in 16 miles.

*One part per billion* is a very small portion indeed. It's *one pinch* of salt in 10 tons of potato chips; 1 drop of vermouth in 500 barrels of gin; 1 bad apple in 2 million barrels of apples.

\* Trademark of the The Dow Chemical Company



## Dr. Etcyl H. Blair: Dow's Feisty HER Spokesman

Dr. Etcyl Blair, a PhD in organic chemistry and director of Health and Environmental Research (HER) for The Dow Chemical Company, Midland, Michigan, takes his job very seriously — but not himself. According to colleagues, who universally regard him with awe and respect, Blair possesses “a colossal energy level coupled with a great sense of humour”. Most people are astounded that he answers his own phone personally — no phalanx of secretaries intercept his calls. He has a deserved reputation for explaining complex scientific data in understandable terms, a respected spokesman impossible for either scientific or lay audiences to ignore.

Recently Blair was keynote speaker at a California seminar on the control of toxic substances. Here are excerpts from that speech:

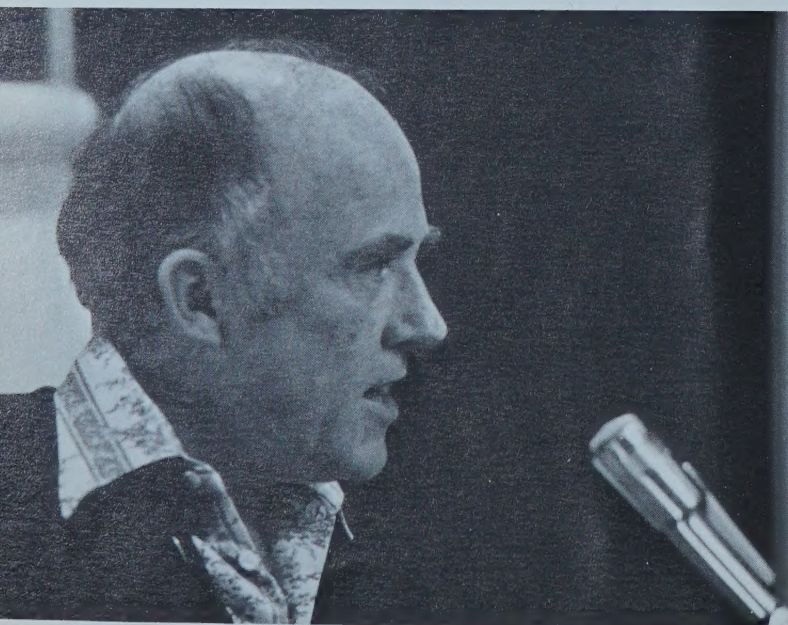
“Corporate leadership in the public arena may be wanting, but corporate leadership in health, safety, toxicology and the environment was established long ago in the chemical industry. The industry has a personal safety record among the very best in the industrial environment, and this is a condition of long standing.”

“In toxicology, for example, Dow hired its first professionals in 1935 and du Pont opened its first toxicology laboratory in Delaware 42 years ago. Union Carbide has had its work done at the Mellon Institute in Pittsburgh since 1937; and many other companies have conducted toxicolo-

gical investigations through funding work in their own or outside laboratories. A very large part of the established literature on chemical toxicology is the result of these efforts and of similar ones funded by private industry in other countries of the world.”

“If these efforts and those of public institutions are of such vintage, why the sudden surge and concern over the past five or ten years? There are, I believe, five major reasons:

- The increasing realization that certain materials can be dangerous on the basis of



Dow's Blair: "Many thousands of normal citizens like us are the corporations."



- long-term exposure to levels that do not present acute exposure symptoms.
- The realization of the potential for biological magnification of certain toxic materials.
- The evolution of one-molecule (zero-risk) theories of cancer causation.
- The rapid extension of analytical techniques to lower and lower thresholds of detections and the resulting speculation this detection permits.
- The rapid dissemination of information, especially if the effects are adverse and if certain segments of the news media can develop sensational stories."

"As a result of these and other factors, materials hitherto thought to have passed adequate safety testing for toxic hazards now must be tested further. The available *long-term* chronic exposure data is not nearly so great as we might wish. Such data is very time and money consuming to produce."

### It takes time, skill

"A proper long-term exposure study typically takes three years from inception to valid interpretation. This takes facilities and people of a specialized nature. Both are woefully in short supply. It also takes consummate skill and subjective judgment to properly interpret the results. And the test results are not the kind of precise scientific or business data we are accustomed to. The potential for error abounds; the need for better means to generate better information is apparent."

"With regard to the environment, all of you are aware of the performance of industry in stepping up to meet environmental regulations of both air and water pollution. Industry is far, far ahead of municipalities, other government agencies, and agricul-

tural activities in meeting federally mandated water pollution goals."

"Government agencies may be happy to take the credit for this industrial progress, but one has to believe that corporate leadership was also a factor. I might add that the discovery of liver cancer among certain workers in a polyvinyl chloride plant was made by the company with the problem; the studies carried out by Dr. Maltoni in Italy were funded by industry; and the problem of obtaining a one-part-per-million workplace environment was solved by industry. It is noteworthy that much of the public is not aware of these industry accomplishments because of the erroneous assumption that these problems were discovered and solved by people in universities and government."

"We do not have to belabor the point. Corporate leadership is and has been very much in evidence in the field of health and environment in the chemical industry for years. We need not beat our chest about it nor be too proud, and we must acknowledge that there have been occasional grievances and failures in corporate leadership in these fields as well."

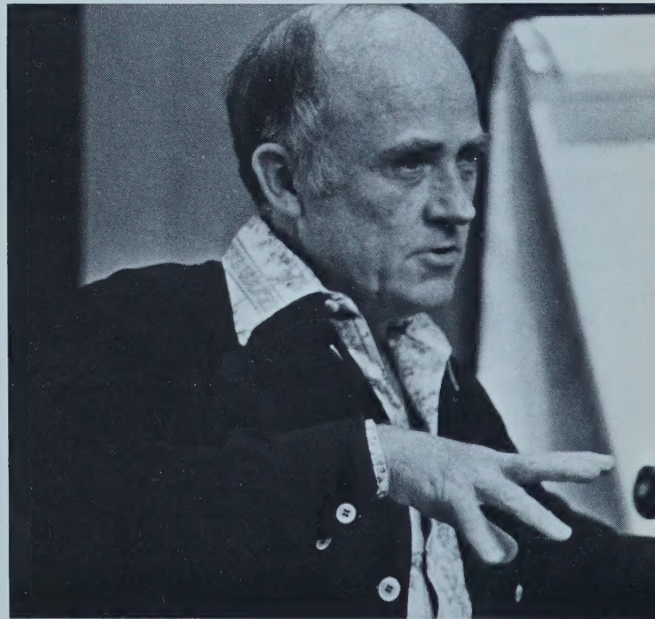
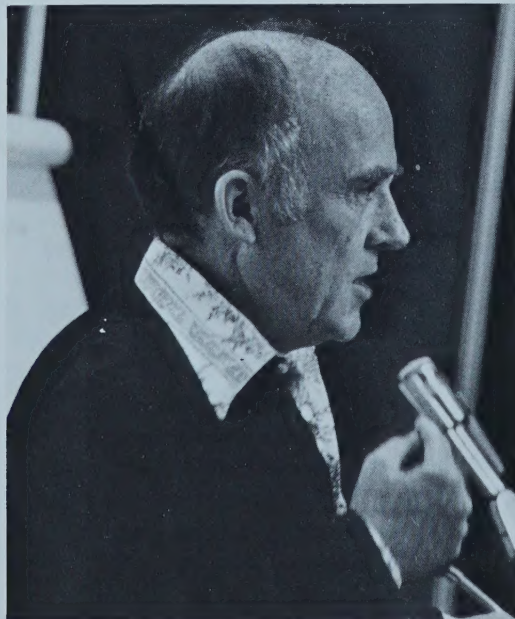
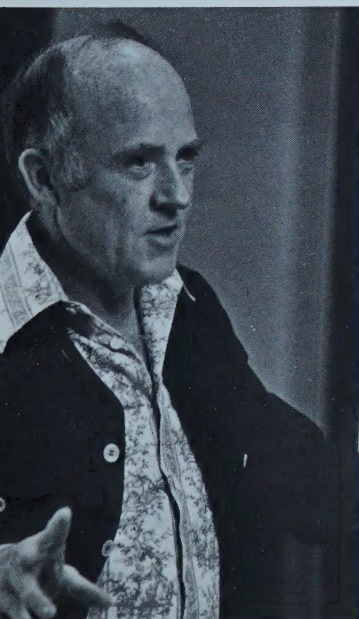
### The individual's role

"The fact is that as individual human beings, as employees, as managers, indeed as corporate leaders, we have the moral obligation, the ethical requirement, if you will, to protect our environment and our fellow man in appropriate ways."

"I frequently grow tired of the corporate critics who talk of corporations as if they were monolithic, selfish, unfeeling, unthinking, even dishonest creatures of an exploited society.

"What these critics don't seem to understand is that we, you and I and many thousands of normal citizens like us, *are* the corporations. *We*

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## The Additive Scare: What Television Isn't Telling Us

By Edith Efron Reprinted with permission: TV GUIDE, June 11-17, 1977

**"One of these days, the Food and Drug Administration is going to discover that Jack Daniel's gives rats cirrhosis of the liver, and we'll be back with Prohibition again."**

That wry comment comes from scholar Irving Kristol, a man who can recognize an old folly masquerading in new garb. It sums up the ineffable silliness of the current consumerist drive to "protect" us from every allegedly unsafe substance that we are putting in our mouths. The media have failed abysmally to expose this silliness of which surely the prize example is The Great Additive Scare. Almost no informational context is being provided on TV to give viewers insight into this bugaboo, when it would be so easy to do so. For example:

1. Consumerists are crying out warnings that the American food industry is putting *chemicals* into our food; that men were never intended to consume *chemicals* but only "natural" foods. Here's what the newsmen should be

adding to this quaint doctrine: (a) that everything that exists, *including* human beings and "natural" foods, consists of chemicals: (b) that there is no *chemical* difference between man-made *chemicals* and "natural" *chemicals*: (c) that consumerists are using *chemicals* as a scare word.

2. Consumerists are warning us that industry is putting tons of *chemicals* called "additives" in our food — in effect, poisoning us for profit. Here's what the newsmen should be adding: (a) that per capita consumption of "additives" per year is about 139 pounds, and that 129 of those pounds consist simply of sugar and salt: (b) that the 129 pounds break down as follows: 102 pounds — sucrose, (i.e., cane or beet sugar), 8 pounds—corn syrup, 4 pounds—dextrose (a simple sugar), 15 pounds—salt: (c) that of the 10

remaining pounds, 9 consist of such innocuous ingredients as pepper, mustard, yeast and sodium bicarbonate: (d) that only one pound of the 139 consists of colorings, emulsifiers, preservatives, etc.—about 1800 different chemicals, many used to prevent food from growing rancid and moldy, rotting, giving you food poisoning or botulism: (e) that the median level of each of these additives is about one-half a milligram per additive per year—the weight of one grain of salt: (f) that every time you've heard a consumerist warning that a particular additive is threatening your life, he has been talking about that one speck per year.

3. The consumerists are now zeroing in on the major additives—sugar and salt. These, they charge, are causing such diseases as heart disease, hypertension and diabetes. That is one of the bases of Sen. George McGovern's entry into the New Food Politics. In my last column, I said McGovern *had prepared a law* that, if passed, would inaugurate new State powers to dictate our diets. McGovern wrote in to say that was inaccurate. Acknowledged. Here's the accurate version: McGovern has *laid the conceptual groundwork for a law* that, if passed, will inaugurate new State powers to dictate our diets. His launching pad is a document called "Dietary Goals for the United States," which seeks, among other things, to slash sugar consumption by 40 per cent and salt consumption by 50 to 85 per cent. Here's what the newsmen should add to McGovern's press releases: (a) that the McGovern Report is dominated by the determination to bring about "behavioral change" in U.S. eating habits—i.e., to manipulate us by taxation, laws and regulation into eating what a Federal food bureaucracy wants us to eat: (b) that the immediate target of coercion is the food industry; example: the McGovern Report launches the idea of banning TV advertising of foods containing the "dangerous" sugar and salt: (c) that dozens of the conclusions in that report—including the disease-causing potential of sugar and salt—are being contested by scientists: (d) that one critic, Dr. Frederick J. Stare, professor of nutrition at Harvard, describes "Dietary Goals" as "essentially a political report prepared by a nonprofessional staff"; and (e) that another critic, Dr. Thomas Jukes, professor of medical physics at the University of California, Berkeley, describes "Dietary Goals" as animated by "Big Brother" impulses.

4. Consumerists are assuring us that

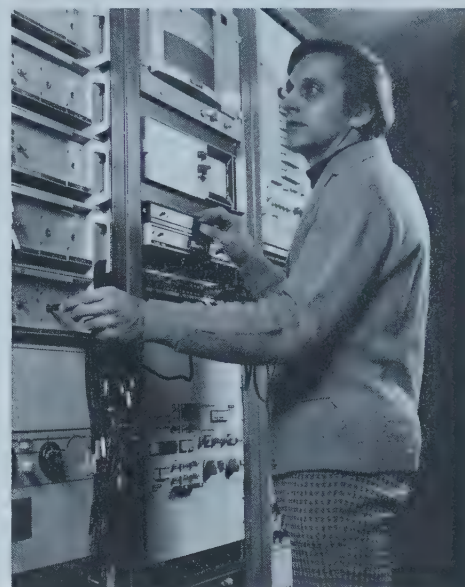


so long as we stick to "natural" foods, we'll all be safe as houses, and that only man-made *chemicals* must be tested by the FDA, fed to rats, etc. Here's what the newsmen should be adding: (a) that "natural" foods also contain "dangerous" chemicals: (b) that bananas, pineapples, and cheese contain chemicals that raise blood pressure: (c) that peaches, pears, strawberries, Brussels sprouts, spinach, white turnips, carrots and cauliflower contain chemicals that cause thyroid disease: (d) that some foods contain poisons (spinach, cashews, almonds, cocoa and tea contain oxalates and free oxalic acid; potatoes contain the poison solamine; fish and shellfish contain arsenic; lima beans break down during digestion into hydrogen cyanide): (e) that some foods contain natural carcinogens (orange juice, flour, cabbage, turnips, sassafras and nutmeg): (f) that egg yolks are carcinogenic to mice: (g) that none of this matters a whit because you get only a trace of these chemicals in normal amounts of food, and the human body comfortably tolerates such traces: (h) that if the present standards used to test and ban man-made chemicals were applied to "natural" foods, a shocking number of them would be declared illegal; that, in fact, it would be illegal to swallow our own saliva, which contains nitrite, a sub-

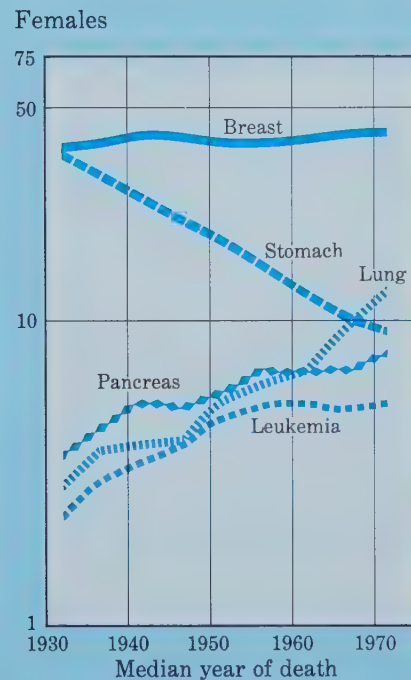
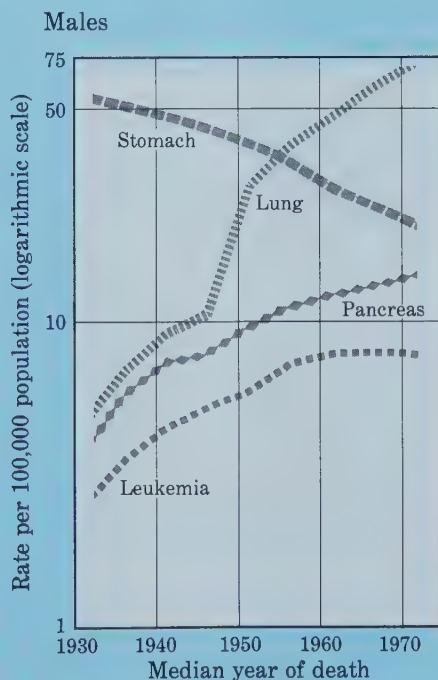
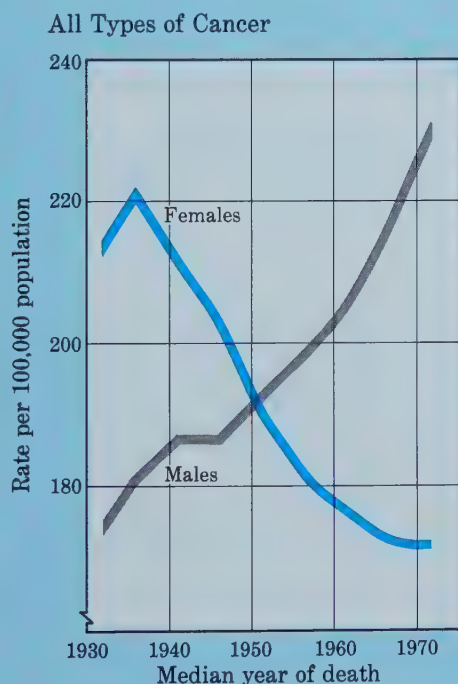
stance that can be transformed in the stomach into nitrosamines (i.e., carcinogens).

5 Consumerists are intimidating citizens into believing that the food industry is a death-dealing institution—a dominantly political campaign. Here's what the newsmen should be telling us: (a) that the life expectancy of Americans is rising; in 1900 people were "old" at 40, dead at 50: (b) that cancer of the digestive organs has no consistent pattern—colon cancer is rising but stomach and liver cancers are declining: (c) that save for the occasional allergies, no known case of illness, let alone cancer, has ever been traced to food additives.

This will do to show you how the failure to provide context plays right into the hands of our fanatical "Prohibitionists." The information is easy enough to get. My food facts and figures come from "Food, Nutrition & You," by Fergus M. Clydesdale and Frederick J. Francis, both scientists at the University of Massachusetts. It was published in 1977. Read it for fast, fast relief from irresponsible journalism. Above all it will show you that research and testing for food safety are important but that the current *standards* are both politicised and insane. □



*Trends in Cancer Mortality Rates in Canada*  
(age standardized: 25-74 years)



Source: "Cancer Patterns in Canada, 1931 to 1974,"  
Bureau of Epidemiology, Laboratory Centre for Disease Control,  
Health Protection Branch, Dept. of National Health and Welfare.



# A Time For Activists

by Henry V. Lewert  
Senior Technical Editor  
Dow Agricultural Products Dept.

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*"This land is ours to enjoy, ours to preserve,  
ours to transmit."*

*Abraham Lincoln*

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Recent efforts to preserve or restore the environment have begun to yield visible results. We all want clean air, clean water, and uncluttered wholesome surroundings. We also want to preserve our land's natural beauty for our own enjoyment and that of the generations to come.

This is not the time to sit back and congratulate ourselves on our successes; we still must look for ways to conserve and increase our supplies of food and energy to keep pace with the growing demand, but we must learn to proceed carefully and deliberately so as to avoid the mistakes of the past and to preserve the delicate balance of our ecosystems. We need all our knowledge, all the resources of science, to avoid a conflict between these goals. And, it is not enough simply to preserve the balance of nature; the balance of nature has to be tilted ever so gently in our favor if we plan to survive. We must remember that man has always been and will continue to be an integral part of nature.

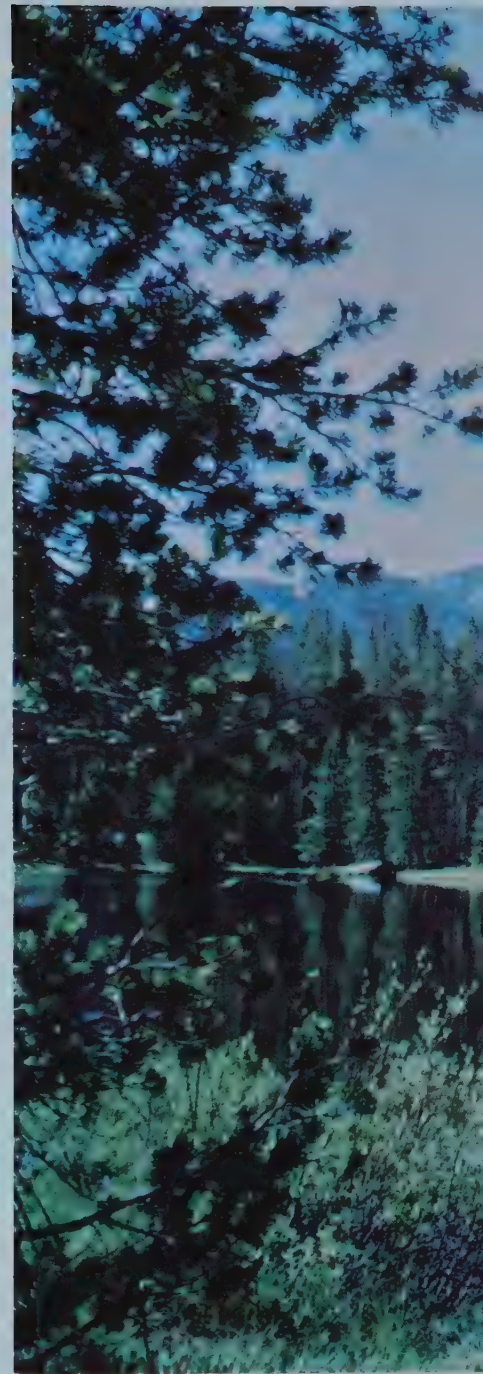
Land and conservation and preservation of wildlife habitat are usually not taken seriously in non-industrial areas of the world, where pressures of starvation often overshadow most other problems. But the most urgent need for land conservation is

in highly industrialized countries, where new highways constantly nibble away at available farm and forest lands, where housing developments are expanding in all directions, and where opulent vacationers flock by the millions to lakes, parks, and wilderness areas. We must continue to protect our wildlife heritage for the sake of our children — constantly strive to increase and improve habitat for wild animals and birds. In many countries, the populations of deer, game birds, and fish have increased dramatically — in most cases as a result of deliberate manipulation of the environment. This situation could be reversed if our agricultural efficiency were reduced and we were forced to return the forests to food production.

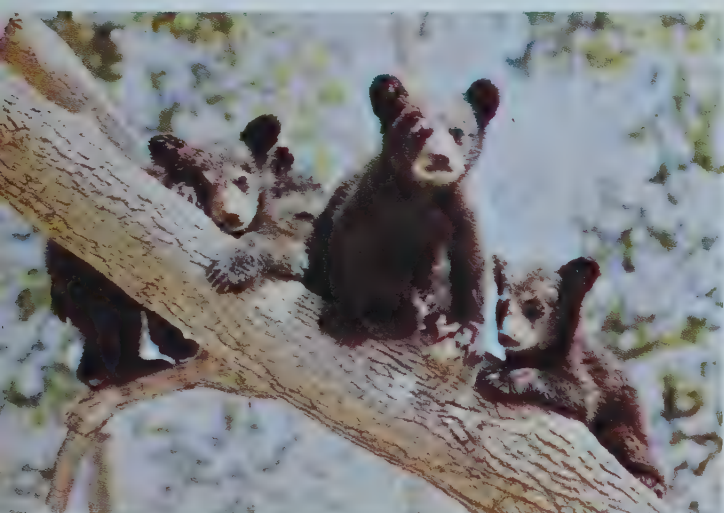
Pollution and the dangers to our health are gradually being brought under control at their source — in the great industrial centres. Much has been done and much remains to be done. Now, more than ever, we need activists to see that the job is finished, but these activists (if they are to be constructively active) need essential tools, and their tools must come from science and technology.

Too many of the people who feel concern for the future of our environment think only in terms of blocking any new activity. Programs that may have profound

*Continued on page 18*









## Claims False, say Agrologist *Continued from page 3*

weeding and organic farming are simply not economical alternatives for commercial agriculture.

Aesthetics of a weed-free environment is not my only concern. We must also realize that weeds pose a hazard to roadside visibility, create a fire hazard,

often harbour insects and diseases and are often orally or dermally poisonous. I am not advocating an all-out chemical war on weeds within the city. In many instances pulling individual weeds, hoeing or cutting will reduce the problem. I am simply saying that 2,4-D

along with other herbicides are excellent partners in an integrated approach to vegetation management.

Yours truly,  
R.S. Cranston, P. Ag., Weed Specialist  
Kamloops, British Columbia □

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## The Charges Against Chemicals *Continued from page 7*

pesticides are well enough informed and concerned about their potential impact on human health and the environment so as to be able to effectively monitor and control their use without the need for this kind of uproar. These are the voices of reason and they are far too quiet.

The voices of chaos are a mixed bag and much too noisy. Who are these people, what are they like? Well, there are the fearful, the ignorant and the superstitious who see demons in the form of pesticides around every corner; the anti-technologist who promotes the fear of pesticides so as to hasten their demise; the scientist who promotes the fear of pesticides in hopes of gaining funds for support of his research; the lawyer who promotes the fear of pesticides so as to win dubious liability cases; and last but by no means least, those portions of the news media that knowingly or unknowingly distort the truth about pesticides.

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**“Any determined investigator can generate data to support a preconceived notion.”**

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Innovative research is slowly dying as the industry shifts more and more of its resources to defense of its current products. The costs of research and development to create a new pesticide are now in the range of \$10-15 million.

Any determined investigator can, with sufficient effort and dedication, generate data to support a preconceived notion that a specific pesticide induces mutations or abnormal growths. One such showing is enough to generate widespread publicity. Putting certain strains of mice under *any* kind of stress will increase the incidence of cancer. Chronic feeding of any chemical at not much below a killing level will certainly stress mice, and that is currently a common practice in the evaluation of compounds for carcinogenic activity.

Let me give you a few examples from a list of hundreds of suspected carcinogens recently published by the U.S. Department of Health, Education and Welfare: some of our major polymers and intermediates; drugs such as penicillin and sulfanilamide; metals such as gold, zinc or cobalt; materials such as paraffin, petroleum, fructose, ozone, ammonia and ethyl alcohol; and finally the essences of life itself such as cholesterol, testosterone, histamine, glutamic acid and lactic acid. Can you believe such a list?

Ironically, there have been reports of increased incidence of cancer in humans as a result of increased emotional stress. I wonder how many additional cancer cases will be caused by our current obsessive fear of man-made chemicals.

---

## Dr. E.H. Blair *Continued from page 13*

are the employees, scientists, engineers, managers, and, indeed, the corporate leaders. We decide what our corporations will be by the individual decisions we make each day. We live in our plants,

we live in the environment, we *are* the environment. Our decisions make the corporations what they are and will be.” □

---

## A Time For Activists *Continued from page 16*

effects on the environment need to be studied thoroughly. Sometimes they have to be blocked to protect the general welfare, but many tried and proven management practices deserve public approval and support.

The laboratory or field scientist who discovers ways to reduce erosion, selectively control dangerous insects and other disease-carrying pests, restore wildlife habitat or check the advance of

plant pests introduced by man, is not fighting nature; he is doing his best to undo the damage created by decades of mismanagement, carelessness and ignorance. He is truly an environmental activist. □



## Buzz Word May Lead to National Tragedy

Cancer is a national, even international, buzz word. Much of the news you see or hear almost daily suggests that chemical after chemical may be a human carcinogen (cancer-causing agent). Crusading pressure groups, some government researchers and regulators, and quasi-scientific 'experts' concentrate their attack on chemical manufacturers, the 'baddies' in today's social milieu. Accusations — implied or directed — concentrate upon the apparent flagrant disregard for chemical hazards and the imputed concurrent epidemics of disease, including cancer.

We don't believe for one minute there is any such epidemic. And there are a lot of others more qualified than we who hold the same belief. Neither do we believe there is flagrant industrial disregard for chemical hazards. Excepting lung cancer, the death rate per thousand population for all other types of cancer has either been flat or declining since 1900. In 1910 our life expectancy was about 47 years. Today it is about 72 years.

Cancer and its causes are not yet well understood and society should continue, even intensify, its efforts to prevent, control and cure it. However, continued misdirection of well-meaning pressure groups and some government agencies (apparently in response to perceived public pressure) could easily turn our attempts to conquer cancer into a monumental national tragedy.

Many proposed regulatory programs these days clearly rest upon the basic notion that *any* chemical found to cause cancer or tumours (benign or otherwise) in *any* animal species under *any* conditions of exposure or dose level will be considered a human carcinogen and banned or restricted to the lowest feasible exposures using the best available technology. Any realistic appraisal of the *actual hazard* to humans, let alone investigation of economic impacts in

terms of jobs or cost/benefit/risk analysis, seems to be totally ignored in the emotionally charged rhetoric accompanying the issue.

Equally clearly, these actions are solely directed toward industrial chemicals only, not the *natural* carcinogens such as tobacco and eggs (found to cause cancer in mice).

The basis for the unwarranted overemphasis on industrial chemicals is an often-quoted and misinterpreted statement that 80 to 90 percent of human cancer is due to "environmental effects" over which we have some control.

What is *not* explained is that less than two percent — and perhaps considerably less — of human cancer is alleged to be due to industrial man-made chemicals in the workplace or in the environment... and that 80 to 90 percent is due to *life style effects* such as smoking, diet, sunlight and so forth. These are indeed "environmental effects."

So if the goal of governments and self-appointed consumer advocate representatives is to protect you and me, why do they spend so much of their resources and energy attacking industrial chemicals? Of course every life is important, but that's not where the really big problems are. Seems like some folks have their priorities inverted.

We are not opposed to testing industrial chemicals. In fact, such testing has been the bedrock of Dow's operating philosophy for decades. We have almost 500 professionals in industrial hygiene, toxicology, biomedical research, epidemiology, environmental science, occupational medicine, genetics, cytology, biology, chemistry, and pharmacokinetics working in the best equipped laboratories in North America. Dow's health and environmental research program was started before Ralph Nader was born!

Today's business world is growing

more and more like Alice's Wonderland. Daily we wander anxiously through a world of increasingly restrictive regulations that in large part appear more politically motivated than realistic. Inadvertently, they often create far bigger problems than the relatively minor ones they solve. For example, more regulations inevitably expand the bureaucracy. You and I pay for that in our taxes, and government *already* takes 43 per cent of the value of all goods and services Canadians produce. Furthermore, the avalanche of new regulations forces smaller industrial concerns — the very ones that account for most of the jobs in Canada — all too frequently to close their doors. Why? Because many of these regulations increase operating costs to a point where they cannot compete in the market place or for the technical expertise needed to comply. Result? The big get bigger (and too frequently, less profitable — to their shareholders disgust) and the small die slowly and quietly. The bitter say it's because of economic cancer.

What can we do? We can let our elected officials and anyone else we can contact know the real picture on carcinogenicity. We can challenge the pseudo-scientific experts who see a tumour under every chemical stone. We can demand a realistic cost/benefit/risk analysis on each health hazard issue — from bureaucrats, from industry, from the politicians, from the unions and from the consumer advocate pressure groups. And we can challenge Canadian news media to report all the facts, good and bad, not just the hysteria-inducing unsubstantiated charges of an 'expert' authority whose credentials are rarely checked.

Former chairman of the Canadian Radio-Television Commission, Harry Boyle, in his recent retirement speech said: "This is a world of misinformation. Never have we so badly needed informed journalists."

D.R. Stephenson







DOW CANADIAN

November 1978

# INSIGHT

AR51

EDITION

- A \$1.5 billion bet
- Anatomy of an environmental crisis
  - Unruly laws for lawmakers
  - Watching the watcher watch the watchers





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Volume 1, Number 2

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"Higher productivity alone brings a long-run increase in the standard of living."

## LETTERS

### Goring's article biased, some people claim

Of course there are many natural chemicals in the environment, and many of these are toxic at low levels. These chemicals have always been around and probably always will be. The question is whether or not we should indiscriminantly add hazardous or potentially hazardous chemicals to those already present. Mr. Goring (INSIGHT, Feb. '78) provides information on each chemical separately and the dangers seem very slight. The problem arises when one considers that in the body the effects can be additive or even synergistic. While one chemical in a small amount may have little effect, when added to the other chemicals present the effect could be greatly increased. This is especially true of carcinogens because the probability of genetic mutation increases as the cells are exposed to more mutagens.

One of the major problems with these chemicals is that they can accumulate in the body. They are not all disposed of, as Mr. Goring suggests. Many pesticides, like DDT, are accumulated in body fat. Although the level in the atmosphere may be very small, through bioaccumulation in the food chain from lower to higher organisms, the level can be multiplied.

Mr. Goring seems to think that since not too many people appear to die from exposure to pesticides, pesticides are not dangerous. This could not be further from the truth. The sublethal effects of many of the pesticides on the market today have not been adequately determined. An effect on the reproductive output of an animal is just as important

in the long term as a direct lethal effect.

I agree that the use of pesticides is necessary and should not be banned completely. However, the advantage must be weighed against the disadvantages. Any chemical that could cause cancer should only be used in very restricted conditions if not completely banned. Other potentially dangerous chemicals should be carefully controlled and used only when absolutely necessary.

Mr. Goring suggests that investigators tend to generate data to support preconceived notions. I suggest to you that people working for a large corporation tend to protect their jobs and the corporation, and may even go so far as to publish a magazine with misleading and even false information. If this kind of information is to be published, I hope in the future you distribute it only within the company itself and not to the general public.

Chris Brunnette, London, Ontario.

\* \* \*

### Natural chemicals more dangerous

I agree with Mr. Goring that there is a difference between the words "toxicity" and "hazard" and that the general public is not aware of this difference. I agree also that our bodies are designed to cope with and eliminate *reasonable* amounts of natural toxins as well as dispose of *minute* amounts of ingested pesticides.

However, I disagree with his statement that nothing is hazardous if we consume it or are exposed to it in small amounts. It is reliance on this false belief that endangers us and our environ-

ment (for we use the same belief toward pollution).

The problem is that the public is not being informed properly or strongly enough about the dangers of natural chemicals. However, the public is slowly becoming well aware of these dangers.

More use is being made of decaffeinated coffee or coffee substitutes, and smokers are becoming a minority group. They turn to natural foods that are more healthful than canned or greenhouse produce because they are not chemically grown or forced nor do they contain preservatives, extenders, or colouring to prevent the growth of harmful bacteria.

In spite of this, I agree with the use of man-made chemicals to increase food production provided they are stringently controlled, used in minimal amounts, but never used until they are exhaustively studied and tested for possible harmful effects on mankind and his environment.

Stuart Craine, Exeter, Ontario

\* \* \*

### Reader shaken by Goring

I was shaken by Cleve Goring's article "The Charges Against Chemicals" in your February 1978 issue.

I am not "a return to nature crank" nor am I an enemy of science. God forbid! I believe in science, in technology, and in life habits as close as possible to nature. I do not systematically mistrust all innovations. However, I often ask myself questions about the desirability of many products (new or existing) which alter the natural balance of my environment or of my body. I prefer a "natural" yogurt to a yogurt loaded with additives and gelatin. I



## Unruly laws for lawmakers

— by Dallin H. Oaks

"When funds are limitless, the only economy made is in thinking."

## Watching the watcher watch the watchers

— by Fergus Cronin

"The media usually take up the most sensational aspect of any given story."

## Bulletin Board

### Editorial: Stewardship

— a new use for an old word

Cover: Sunlight casts intriguing shadow pattern from the stairway on a chemical storage tank at Dow's Fort Saskatchewan plant site.

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prefer cross-country skiing to riding a snowmobile. I find 2,4-D very useful for killing "natural" weeds in my lawn. However, I shall not hesitate to stop using it if another chemical with the same efficiency and a comparable price but less damaging to the environment becomes available. In summary, I consider my attitude to chemical products as moderate and reasonable.

Mr. Goring's article was intended to be very reassuring about hazards of synthetic chemicals. If I was shaken it was because I was somewhat reassured against my will. I confess that it was not without prejudice that I started to read your journal, the major goal of which is to defend the commercial interests of The Dow Chemical Company. However, the comparisons set forth by Mr. Goring on the natural toxins are astounding. Undoubtedly he is correct to state that one must think twice before condemning man-made toxins.

Prof. F.P. Gingras,  
Political Science Dept.,  
University of Ottawa, Ottawa, Ontario

\* \* \*

### Wider attention needed

It is welcome news that responsible spokesmen in the chemical industry are raising their voices to contradict the wave of mindless hysteria that has taken root in some peoples' minds with respect to the alleged abuses of chemicals in food, agriculture, and so on. I would like to see the sort of message conveyed by your February issue receive wider attention.

Prof. W.A.E. McBryde, Chemistry Dept.,  
University of Waterloo, Waterloo, Ont.

\* \* \*

Congratulations on an excellent job! In an age of information "over-kill", the concise well written articles, by people who are obviously experts in their fields, were most welcome.

G.A. Meyers, Niagara Peninsula  
Conservation Authority, Fonthill, Ont.

\* \* \*

It is good to see a pesticide manufacturer publish such articles. I hope there are now enough people ready to read something about the background of the problems, and of the necessity of insisting that all media including TV, radio, newspapers and magazines, provide the proper context that is too often pared away in the interest of sensation and keeping items short.

Prof. C.B. Kelly, Environmental  
Biology Dept., Ontario Agricultural  
College, Guelph, Ontario.

\* \* \*

The Chemistry Department of Concordia University is holding an "Open House" for all the high schools in Quebec in April this year. We would like to distribute a copy of *Dow Canadian, Insight Edition*, February '78, to every student that attends. Could you send 700 copies to us for this occasion?

G.J. Trudel, Asst. Chairman, Chemistry  
Dept., Concordia University, Montreal,  
Que.

(Ed. Note: Shipped, with our compliments.)

\* \* \*

I have today received a copy of your February issue of *Insight Edition* and I must congratulate everyone involved for its production. It is high time that industry started to take a positive

position on a number of these subjects and I look forward to receiving further copies.

W.J. Hemmerick, Q.C., Toronto,  
Ontario.

\* \* \*

I found your magazine both interesting and informative, and I look forward to reading future issues.

Elizabeth Kaegi, M.D., M.Sc.,  
Western Health Services Research Ltd.,  
Calgary, Alta.

I deal almost daily with papers in various languages on protection of environment and health. Your journal certainly will help put matters into perspective! Please continue sending it.

Dr. Vladimir N. Nekrassoff, M.D.,  
Ottawa, Ontario.

\* \* \*

The Entomology-Plant Pathology Branch, B.C. Ministry of Agriculture, would appreciate receiving 10 copies of your February '78 issue. These will be distributed to our staff — all of whom are interested in the pesticide articles.

H.J. O'Reilly, Head, Entomology-Plant  
Pathology Branch, Ministry of Agriculture,  
Victoria, B.C.

\* \* \*

I have circulated your February '78 issue of *Insight* to the supervisors responsible for junior and senior high schools. It is their opinion that it would be very useful as information to our secondary school levels.

S. Rosemary Donovan, Exec. Sec'y to  
the Superintendent, Calgary Roman  
Catholic Separate School District I. □





## BUSINESS

# Dow bets a bundle in Alberta

"The petrochemical aspect of the new industrial development in Alberta will have a greater impact on raw material availability to Canadian industry than any similar development the world has ever seen."

by Tom Piggot<sup>1</sup>

This extract, taken out of context from a brochure just published by the Western Canada Division of Dow Chemical of Canada, sums up the part the company is playing, to the tune of around \$1.1 billion, in the extensive petrochemical industry in Western Canada.

Massive new construction at Fort Saskatchewan, scheduled for completion in 1979, will encompass, in addition to expansion of existing plants, new plants to produce ethylene dichloride, vinyl chloride monomer, ethylene oxide and ethylene glycol, together with world-scale caustic soda and chlorine

plants and a new facility, the largest in the world, to manufacture plastic foam insulation under the trade name of Styrofoam.\*

Dow is also sharing one-third of the cost of construction of the \$350 million Cochin Pipeline linking Fort Saskatchewan with the company's Sarnia plants in Ontario and other Eastern Canadian markets.

### Project networks

For the Alberta projects Dow has direct commitments in the order of \$600 million of new invested capital. In addition, through various take-or-pay commitments on ethylene and ethane, the company has commitments to its business partners resulting in the equivalent of an additional \$500 million to \$600 million of capital. It is consider-

ed, therefore, that Dow's commitment to the Alberta project is the equivalent of 1.1 to 1.2 billion dollars.

The project is the largest single undertaking that Dow has ever been involved with for a petrochemical project on a world-wide basis.

Its business partners in Alberta are Dome Petroleum, Alberta Gas Trunk Line and Pacific Petroleums.

The entire project involves the \$400 million expansion at Fort Saskatchewan plant site, the Cochin Pipeline, estimated to cost \$350 million, four ethane extraction plants and gathering systems, at an estimated cost of \$250 million and an ethylene plant at Red Deer which Dow is engineering for Alberta Gas Ethylene, a wholly-owned subsidiary of Alberta Gas Trunk Line. Dow is also responsible for construction and start-up.

The Fort plant site expansion includes four world-scale plants currently under construction. They comprise a second chloralkali plant, completion of which is scheduled for the first quarter of 1980; a vinyl chloride monomer plant and ethylene dichloride plant, with completion scheduled for the third quarter of 1979; and an ethylene oxide and ethylene glycol plant, completion of which is scheduled for the third quarter of 1980.

A second Styrofoam (extruded polystyrene foam insulation) plant is being constructed and is scheduled for completion in the fourth quarter of 1978.

A steam and power plant, which will supply energy requirements for the plant site, is scheduled for completion in the last half of 1979. Many other necessary support facilities such as 11 miles of trackage and shunting yards and extensive underground ethylene storage facilities are also being developed in various phases at the Fort site.

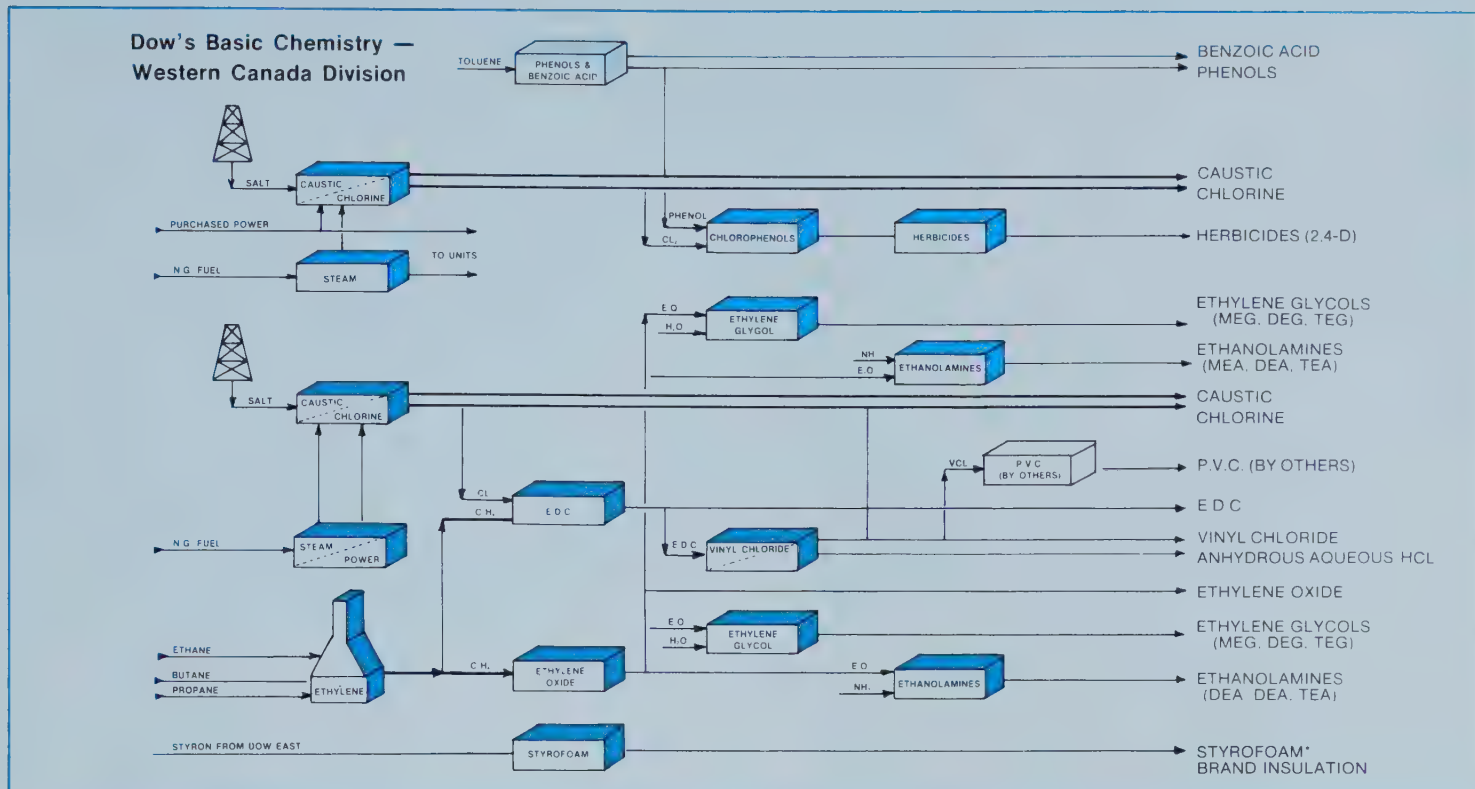
The Cochin Pipeline, approximately 1,900 miles long, starts in Fort Saskatchewan, continues east and turns south entering the U.S.A. in North Dakota; it exits the States at Windsor, Ontario and terminates in Sarnia.

The pipeline will transport ethane and ethylene to U.S. export markets and to Dow's Sarnia Division. Only the ethylene that is surplus to Dow's requirements in Alberta will be marketed out of the Province.

Dow Canada is comprised of two divisions, the Western Canada Division, which includes Fort Saskatchewan and

<sup>1</sup>Tom Piggot is executive editor of Construction Alberta News and of In-Site Monthly. He is based in Edmonton.





Ladner, B.C., plant sites, and the Sarnia Division in Ontario, plus manufacturing facilities at Richmond Hill, Weston, Ontario and Varennes, Quebec. Sarnia is also the head office of the Canadian operation. Approximately 3,000 people are employed by Dow Canada.

Sarnia Division is the largest Dow operation in the country. The major development taking place there at present is a low density polyethylene plant, which is 90 per cent complete. The facility is scheduled to be operation-

al in the fourth quarter of this year. The plant will produce low density polyethylene. This material is used in the plastics industry for manufacturing injection molded housewares; garment bag applications; cast stretch film; etc.

### Fort operations

The connections that Dow Chemical of Canada, Limited have had with Fort Saskatchewan go back to 1959 when salt, hydrocarbons, power and transportation attracted the company to

invest in a 700-acre site.

To this day, the ethylene glycol, ethanolamine, chlorophenol, agricultural chemical and chloralkali plants have fulfilled the original intention to serve expanding markets in the Western Provinces, and within a few years, the site had been expanded to 1,540 acres in anticipation of possible expansion; and now, the term "world-scale" is the one most often used to describe the new petrochemical project.

Ethylene glycol is used in the produc-

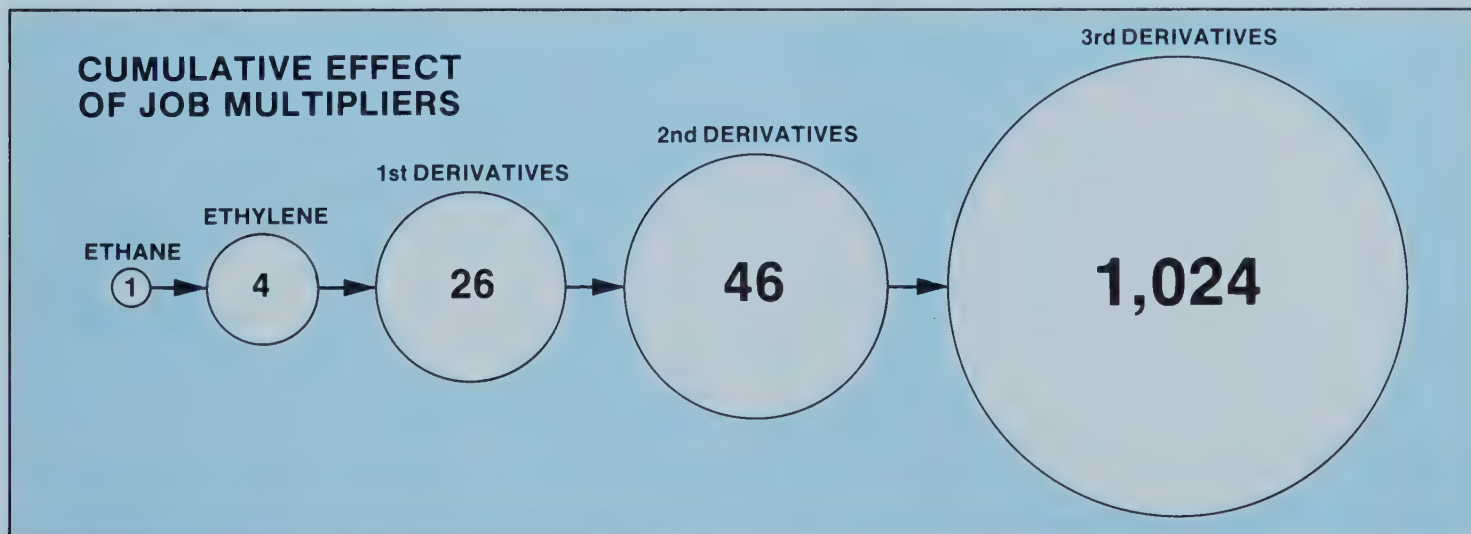


Chart showing the cumulative effect of the further downstream processing of ethylene. For each job created in the extraction of

ethane, four jobs are created in the manufacture of ethylene, a total of 26 up to first line derivative plants (such as vinyl chloride), a

total of 46 to second derivatives level (such as PVC) and over a thousand in the third line derivatives level.



tion of antifreeze and chemicals employed in the natural gas industry.

Vinyl chloride monomer (VCM), made from ethylene dichloride, is the primary raw material used to make polyvinyl chloride plastic resin (PVC). This resin is in great demand for the manufacture of residential siding, pipe, packaging films, housewares, garments, upholstery, hi-fi records, etc.

Some of Dow's production of vinyl chloride monomer will go to the new Diamond Shamrock Alberta Gas plant where it will provide the basic feedstock for the manufacture of PVC resin.

In a much wider sense Dow's production of feedstocks will have a significant impact on many industries throughout the world, from agricultural herbicides to plastics, and forecasters predict that polyethylene capacity in Canada will more than double, styrene capacity will more than double, polyvinyl chloride capacity will more than double and the production of vinyl chloride monomer will increase from about 200 million pounds a year to about 900 million pounds.

Some of the past production at Fort Saskatchewan has been the manufacture of various technical 2,4-D esters and amines sold to formulators who produce finished 2,4-D products for farm and home herbicide use against broadleaf weeds. And Dow also produces equivalent products using its own material and formulae to market a variety of Dow-labelled herbicides.

## The Ladner plant

Dow's plant at Ladner in British



Construction at Fort Saskatchewan: by 1981 a \$16 million annual hype for the local economy.

Columbia also comes into the picture.

The booming plywood industry in B.C., coupled with the availability of deep-sea port facilities, attracted the company to the Ladner site, a few miles from Vancouver airport, in 1960. Small by comparison with the Fort Saskatchewan operation, the Ladner plant uses toluene to produce phenol and benzoic acid using Dow's own oxidation process.

Phenol, in combination with formaldehyde, is used in the production of waterproof glue for the manufacture of plywood while benzoic acid, a prime ingredient in the production of sodium benzoate, a food preservative, is largely exported.

This phenol, however, is also a major ingredient in a Fort Saskatchewan process.

## Economic effects

In the single year, 1976, the presence of Dow Chemical in Fort Saskatchewan was worth \$42 million in goods and services purchased from local suppliers and wages paid to employees on site.

The company is projecting at least 350 additional permanent employees to its payroll once plants under construction come on stream. Those employees will be paid a projected total of \$16 million annually.

At Fort Saskatchewan alone, Dow will have spent more than \$400 million on new plants and plant expansion.

The company's contribution to the local, Alberta and Canadian economy goes much further than investment plainly visible at the Fort Saskatchewan site, however — notably in its impact in creating jobs all the way to the finished product stage.

The accompanying chart (page 4) demonstrates the job multiplier factor from the production of ethane from natural gas to third-line derivatives.

And of foremost concern to Canadians is the fact that, currently, 50 per cent of all ethylene being bought by Canadian consumers is being imported in the form of finished products. So the implications of the new developments for all Canadian manufacturing, wholesale and retail industry are enormous. □



Ethane recovery plants and pipeline system (in green) supplying the AGE ethylene plant at Joffre. Ethylene is then pipelined to Dow's Fort Saskatchewan plants. The Cochin pipeline (in red) will

transport ethane and ethylene surplus to Alberta requirements to U.S. export markets and to Dow's Sarnia petrochemical complex.



# Ethylene products "tree"



Ethylene is the world's most important petrochemical building block. Discovered by four Dutchmen in 1795, ethylene is a colorless gas with a faint pleasant odor. It is produced from ethane, a component of natural gas, or from crude oil via a naphtha

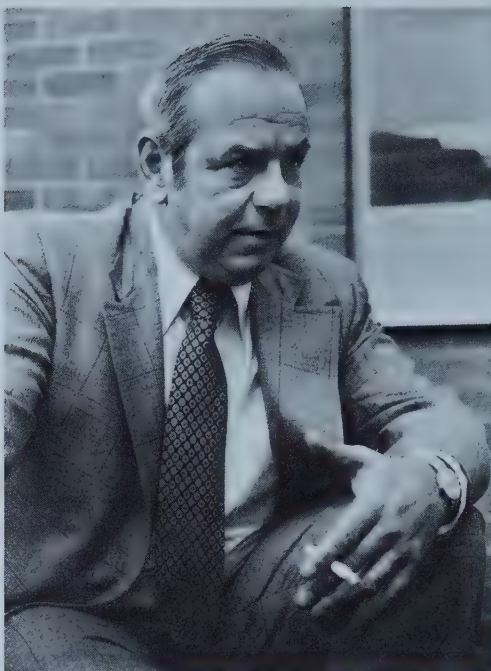
cracker. Ethylene is reacted with other basic chemicals, such as benzene, propylene and chlorine, to produce chemical "intermediates". These in turn are combined with still other chemicals to produce a vast array of second-line derivatives which provide the

raw materials for a multitude of end products that touch the daily lives of everyone. A few of these ethylene-dependent end uses are depicted around the perimeter of this diagram.



## High rollers at the Diamond Ranch

**"The almost unavoidable conclusion is that the people behind it not only have a lot of know-how, but a lot of courage."**



Naegele: Homespun analogies help to zero in on the heart of a problem.

In all of Dow's 81 years there has never been anything as big as its Alberta Project. The almost unavoidable conclusion is that the people behind it not only have a lot of know-how, but a lot of courage.

Those with such qualifications actually number in the hundreds. They are, for the most part, little known even within Dow. Yet their collective experience and expertise represents the vital resource so essential to the success of the Project. They are the design engineers, the financial analysts, the estimators, the project managers, the safety supervisors, the traffic specialists, the accounting people, the computer experts, the buyers, the employee relations people, the personnel recruiters and trainers, and more.

These are the people that make it all happen. But to outsiders, those who must take the ultimate responsibility for Dow's billion-dollar-plus Alberta Project — Messrs. Naegele, Hay, Mort, and Elliott — are more visible. Their management styles and philosophies set the tone for all Dow Canada's projects and growth planning:

In news-media parlance, *Robert E. Naegele* (pronounced Nay-gee) is "good copy." A big man with a sense of humor to match, Dow Canada's 51-year-old president and chief executive officer is an effective speaker — particularly

when dealing with favorite topics like economics and bureaucratic boondoggles.

Refusing to work from prepared texts, Naegele sprinkles his off-the-cuff talks with homespun analogies. Referring recently to Canada's economics woes, for example, he described the problem this way: "It takes four horses to pull the Canadian wagon: business, labor, money and government. Unfortunately, government is preoccupied with the national unity issue, wage and price controls and a host of socialistic programs. They've got the harness so tangled with counter-productive controls that all four horses are hitched at right angles to one another — and then government yells 'Giddyup!'"

His natural speaking style reflects his early days as a chemistry instructor at St. Louis University, also at Marquette University where he had previously earned his B.Sc. and M.Sc. in chemistry and physics and a B.A. in naval science. In 1951 Naegele joined Dow Chemical U.S.A. in sales and for the next 17 years progressed through a variety of sales and marketing positions, culminating in a seven year stint as manager of the large Agricultural and Organic Products department in Midland, Mich.

The next move was the big one: to the presidency of Dow Chemical of Canada, Limited in January of 1975 and appoint-



Elliott: Good coaches put their players in positions where they perform best.

ment to the board of directors of the parent Dow Chemical Company in 1977.

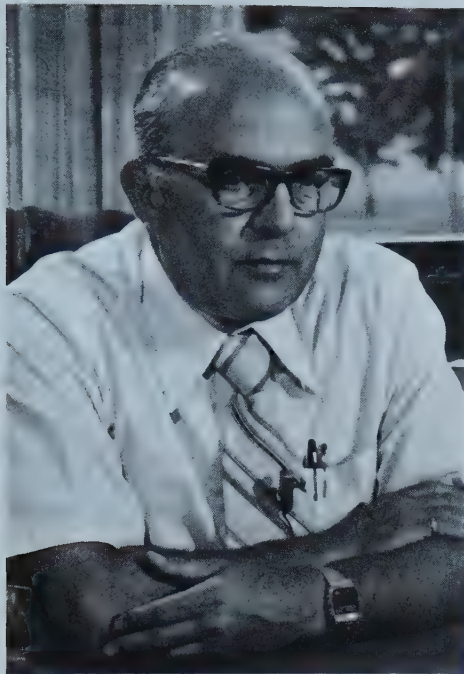
Today the picture of Bob Naegele, president, emerges in the comments of associates. His strength, they feel, lies in his ability to delegate both authority and responsibility to his vice presidents. One associate summed him up this way: "There's no doubt about his leadership. And he has an uncanny ability to cast chaff aside and get right to the heart of a problem."

\* \* \*

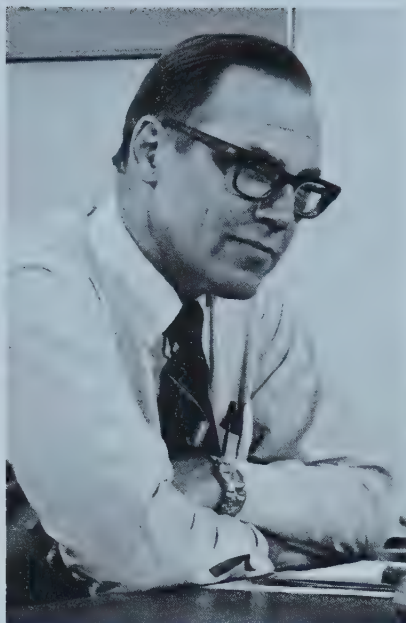
When *Owen F. Elliott* compares his sales organization to a professional sports team there's an echo of a hero of his: the late, great combative coach, Vince Lombardi. Dow Canada's 51-year-old Commercial vice president sees clear analogies between business and sport. "Winning teams are strong in every position," he says, "and my whole strategy has been to put my players in positions where they perform best."

The record shows that Elliott's approach pays off. A native of London, Ontario, he graduated from the University of Toronto with a B.A.Sc. degree and joined Dow in 1951 as a field salesman for the Ontario Sales Office in Toronto. In 1956 he was named manager of the Alberta Sales Office and he spent five years in Stampede country before returning to Toronto as Ontario General Sales Manager.





Mort: One must have a bottomless well of energy, patience and durability.



Hay: People as individuals are the life blood of any enterprise.

When he transferred to Switzerland as GSM of Dow Chemical Europe S.A. in 1969, he had built record sales in Toronto, establishing that office as No. 1 in Canada and boasting the third largest sales volume of all Dow offices worldwide.

Three years later he was back in Canada to take up his present responsibilities and to join the Dow Canada board of directors. Since then, his teamwork approach has boosted sales from \$150 million in 1972 to \$370 million by the end of 1977.

Owen's greatest challenge will come in the next three years as "coach" and "players" go after an annual sales target of a billion dollars. "It's going to take a very well thought-out game plan," he concedes, "plus solid execution by all of us — a commitment to excellence, all the way. But we're going to make it. As a team."

\* \* \*

For four-and-a-half years *Clifford L. Mort's* energy, patience and durability were tested to the limit as he directed the establishment phase for Dow's Alberta Project. "We presented our case at eight public hearings," he recalls, "and obtained well over a hundred individual government approvals, many of which had not been required when we started our studies. In fact, new regulations and

whole new boards seemed to appear faster than we could solve the problems we already had."

With one home in Sarnia and another in Calgary, Mort logged many hours of air time as he criss-crossed the country to attend a seemingly endless succession of meetings. With a small group of aides and specialists, he prepared and presented hundreds of proposals and counter-proposals until, in 1976, the last hurdle was cleared. The green light came on for the biggest single venture ever undertaken by Dow in this or any other country.

For the 54-year-old Torontonion, this was the high point in a career which began with graduation from the University of Toronto with a B.Sc. in chemical engineering. Joining Dow as a process engineer in 1951, he held a number of plant and sales positions prior to his appointment as general sales manager in 1969. In 1971 he became a director of Dow Canada and took the post of vice president, Business Development, one year later.

In 1976 Cliff's handling of his intricate task was rewarded by the move to his present position: vice president, New Business Ventures, Services and Government Affairs.

\* \* \*

*James M. Hay*, a 48-year-old native of Regina, reached his career crossroads

earlier than most. In the late 40's his performance in Junior 'A' and university hockey had attracted NHL scouts. Notwithstanding their appeals, Jim chose to follow his father's footsteps in industry. In 1957 he joined Dow Canada in Sarnia as a process engineer with a B.Sc., M.P.E. and Ph.D. from the universities of Saskatchewan, Tulsa and Toronto respectively.

Various managerial positions followed until his 1968 appointment as assistant business manager, Hydrocarbons, at international HQ in Midland, Mich. While there, he also worked in corporate planning, tech center administration and in information systems. In '73 he returned to Sarnia as vice president, Manufacturing and as a director of the Canadian company. Two years later he was made vice president, Operations, with enlarged responsibilities.

Under Hay's direction, production volume has increased markedly, but the greatest growth is yet to come. He and his hand-picked team of top supervisors spearhead many expansions, modernizations, and new construction projects now underway throughout Canada, apart from the gigantic Alberta Project.

These are busy days for Jim Hay, but he still finds time to work out regularly on the squash courts. And his hockey background emerges when he borrows his son's hockey gear and heads for a pick-up game with fellow employees. □





## Anatomy of an environmental crisis: Mercury in the St. Clair River

by D.M. Young, B.Sc., Ph.D.<sup>1</sup>

When traces of mercury were found in sediments of the St. Clair River near the outfalls of Dow Chemical of Canada, Limited's plant at Sarnia, Ontario, in May, 1969, Dow started a program to reduce mercury losses from its two mercury cell chloralkali plants (producing chlorine and caustic soda from salt brine). In February, 1970, the Ontario Government notified Dow that mercury had been detected in fish from the St. Clair River and asked for a speeding up of the mercury control program. The Company immediately launched a crash program to eliminate mercury losses to the river. Thus, when the Canadian Government ban on commercial fishing was imposed on March 24, Dow was able to isolate the mercury cell plants within three days. A similar program aimed at eliminating losses at Dow's third chloralkali plant, at Thunder Bay, Ontario, was also completed by the end of March, 1970.

During 1970 Dow Canada began the design and engineering of a new chloralkali plant based on the diaphragm cell process, which uses no mercury. This \$40 million project was the only permanent way to reduce mercury losses to zero.

This plant was commissioned in the summer of 1973 and the two mercury cell plants were shut down and later demolished. The smaller mercury cell plant at Thunder Bay was also shut down and dismantled and the pulp mills in that part of Ontario were supplied caustic by ship and chlorine by rail from Sarnia.

The decision to shut down all three mercury cell plants, announced in May, 1970, was a voluntary commitment on the part of Dow Canada. At no time was Dow in violation of any government mercury emission standards and, further, the project was well in hand by March 1971, when the Province of Ontario filed a \$25 million lawsuit against Dow.

### Formation of methyl mercury

Metallic mercury was not formerly regarded as a serious contaminant in water because, like most metals, it is almost completely insoluble in water. In fact, the practice of storing metallic mercury under water was widely recommended to prevent release of toxic

mercury vapor. Even soluble inorganic salts of mercury, in trace concentrations, were not considered hazardous to fish. How, then, did mercury accumulate in fish?

We now know that inorganic mercury compounds can be transformed by micro-organisms into methyl mercury compounds which are absorbed by and accumulate in fish. As we ascend the food chain and small fish are eaten by larger predators, the concentration of methyl mercury in the fish increases. This food chain ends with man eating the larger fish.

**"The Federal Government was already active on this whole question in 1969, but when the *London Free Press* printed a speculative article, everybody panicked and it became a major issue."**

— D.M. Young

Methyl mercury compounds are highly toxic to man and are known to have caused a number of human poisoning epidemics, notably the Japanese trage-



dies at Minamata (1953-1960) and at Niigata (1965). In these cases, however, the problem was traced to the direct discharge of methyl mercury compounds in industrial effluents. It was not until 1967-68 that Swedish scientists announced their findings that inorganic mercury from mercury cell chlor-alkali plant effluents could be biomethylated by bacteria to form the highly toxic methyl mercury. Unfortunately, these reports failed to reach North American scientists in industry and government until 1970.

## The mercury cell process

Chlorine and caustic soda are basic industrial chemicals made simultaneously by the electrolysis of sodium chloride (common salt) brine. The mercury cell process was originally patented in 1892, but its later industrial importance can be traced to developments in Germany during World War II. It became the process of choice because it yields directly a caustic soda solution of high strength and exceptional purity. The process involves passing brine through a cell consisting of a graphite anode and a flowing mercury cathode. When a direct current is applied to the cell, chlorine gas is liberated at the graphite anode and sodium metal, which migrates to the mercury cathode, dissolves in the mercury, forming a liquid amalgam. The amalgam flowing out of the cell is fed to a decomposer where the dissolved sodium reacts with water to form pure sodium hydroxide (caustic soda) and hydrogen gas.

<sup>1</sup> Dr. David M. Young, Manager of Environmental Affairs for Dow Canada, prepared this article several months ago as a case study for the United Nations Environmental Program. Since 1971, Dow has refrained from commenting on the mercury issue because it was the subject of several lawsuits. Now that Ontario's mercury suit has been settled, a review of the mercury crisis is timely.

After completing his university education at Imperial College of Science and Technology (University of London, England) in 1949, the author was assistant lecturer in chemistry at University College, Dundee, Scotland. In 1951, he embarked on a series of post doctoral research fellowships at Amherst College, Massachusetts, The National Research Laboratories, Ottawa, The Royal Military College, Kingston, and the University of Munich, Germany. He joined Dow Canada as a research chemist in 1956, pursuing a career in chemical research until assuming his present role in 1975. He has been the Company's expert on mercury since 1970.

## Dow Canada's mercury cell plants

Dow Canada operated three mercury cell chloralkali plants — two at its Sarnia, Ontario, complex and the third at Thunder Bay, Ontario. The start-up dates and 1970 chlorine production of the three plants were as follows:

	Start-up Date	1970 Chlorine Production, tons/day
Sarnia		
Chlorine I	1949	160
Chlorine III	1965	250
Thunder Bay	1967	80

## Events leading up to the discovery of mercury in fish

May 14, 1969:

Ontario Water Resources Commission (OWRC, forerunner of the Ministry of the Environment) notified Dow informally that mercury had been detected in the course of a 1968 sediment survey of the St. Clair River, mainly below the Dow outfalls.

July 4, 1969:

OWRC made a second, more complete river bottom survey.

July 25, 1969:

Results confirmed the 1968 results. Over 1,000 ppm of mercury<sup>2</sup> had been found in some sediment samples below one of our outfalls.

August 12-15, 1969:

A complete in-plant industrial wastes survey, conducted by OWRC, included a discussion of the mercury problem and the steps Dow was taking to reduce its losses.

February 4, 1970:

OWRC reported high mercury levels in fish taken from the St. Clair River as far downstream as Lake St. Clair (approximately 40 km from the Dow plant).

## Dow's crash program

On February 4, OWRC asked Dow for additional information on the escape of mercury from the plant and for a speed-

up of the program which was already underway for reducing mercury losses. As a result of that request Dow immediately implemented a crash program to eliminate the mercury losses.

One month later, OWRC complimented Dow Canada on its clean-up program:

"We were pleased to note the progress that has been made and hope that your plans for further reductions and ultimately elimination of mercury in your waste discharge are equally successful. We have already made use of your experience in preparing a letter which has been sent to all chlor-alkali plants..."

(letter from R.M. Gotts, OWRC, March 4, 1970.)

On March 24, the Canadian Federal Department of Fisheries announced a ban on the export of fish containing more than 0.5 ppm of mercury. By this time, Dow's remedial program was sufficiently advanced that we were able to make a number of temporary installations of additional piping and equipment and completely seal off the plant, within three days. Subsequently, these facilities were replaced by a more permanent installation. A similar mercury control program was successfully carried out at Dow's Thunder Bay plant.

**"The litigation process required us to maintain silence from 1971 onwards."**

— D.M. Young

The dramatic reduction in effluent mercury losses from Canada's fifteen mercury cell plants was mentioned in a January, 1971, speech by the Federal Minister of the Environment to the House of Commons. The Ministry's figures cited for Dow Canada's three plants were:

Effluent Mercury Losses In lbs/ton of Chlorine Produced		
	1969	Dec. 1970
Sarnia (2 plants)	0.15	0.0017
Thunder Bay	0.15	0.0009

These numbers are well below the figure of 0.01 lbs/ton considered at that time by Swedish experts to be the limit of modern technology.

<sup>2</sup>All mercury concentrations cited are total mercury which includes mercury in all its chemical forms (metallic, inorganic, methyl mercury, etc.).



## New analytical methods

A key factor in Dow Canada's mercury control program was the development of a fast reliable analytical method capable of measuring extremely low levels of mercury with good accuracy.

Prior to 1968, the only available method was the Dithizone technique. It was tedious, relatively insensitive and subject to interference from other elements present in the sample. Under ideal conditions, it could be used to measure 0.2 ppm of mercury with an accuracy of  $\pm 10\%$ . In October 1968 Dow Canada analysts developed a new, faster method based on a newly available instrument: the atomic absorption (AA) spectrophotometer. By September 1969 they had developed an improved AA technique which could analyze 0.01 ppm in urine<sup>3</sup> with  $\pm 5\%$  accuracy. The same technique later applied to process effluents could analyze down to 0.0002 ppm with  $\pm 5\%$  accuracy.

**"The AA analytical method was a milestone. The earlier method was inaccurate, slow and costly."**

— D.M. Young

By March 1970, Dow Canada had developed an AA method capable of detecting 0.05 ppm of mercury in fish (accuracy was  $\pm 10\%$  with samples having more than 0.5 ppm).

These new, refined analytical methods developed in Sarnia were the cornerstone of Dow's control program. Copies of the procedures were distributed to government agencies, other industries, and universities as a public service and to ensure that those monitoring our control program had tools as sharp as our own. The Dow Canada analytical methods were endorsed by other analysts and soon became the standard AA methods for total mercury. Adopted by the Chlorine Institute, they are still the standard methods used throughout the chloralkali industry.

## Replacing the mercury cell plants

During 1970 Dow Canada began the design and engineering of a new chlor-

alkali plant based on the diaphragm cell process which uses no mercury. This was Dow's long term solution to the mercury problem, recognized as the only permanent way to reduce mercury losses to zero. The decision to shut down all three mercury cells was announced by Dow in May, 1970. It was a voluntary commitment; at no time was Dow in violation of any government mercury emission standards. The project was well under way by March 1971, when the Province of Ontario filed a \$25 million lawsuit against Dow.

The new, \$40 million Sarnia chlor-alkali plant came on stream in mid-1973. A world-scale plant, its design was based on the total recycle concept. During the same year, Sarnia's Chlorine I and Chlorine III mercury cell plants were shut down and later demolished.

The Thunder Bay mercury cell plant was also shut down in 1973. Although Dow's control strategies for removing mercury from the effluent and for recovering mercury from waste brine sludge had been successful in reducing mercury emission to a level well below government requirements, we felt that nothing short of a complete shut-down would reduce mercury losses to zero. In order to assure its Northern Ontario customers of an adequate supply of caustic soda, Dow built a marine terminal on the plant site and supplied it with caustic by boat from Sarnia, a distance of 470 nautical miles. Chlorine is shipped by rail from Sarnia.

## Environmental recovery of the St. Clair

In 1970 Dow Canada was under strong government pressure to "clean up" the St. Clair River bed by dredging the mercury contaminated sediments. Several established experts consulted by Dow expressed the opinion that dredging would stir up mercury laden fines and spread the contamination. This conclusion was supported by laboratory simulations using actual sediment samples. Further, a well-known sedimentologist, engaged by Dow to conduct an extensive sediment survey of the entire system from Lake Huron through to Lake Erie, concluded that the St. Clair River delta effectively traps sediment being carried down the river. He gave the opinion that whatever Dow may have introduced in the past is being covered and will continue to be covered within this delta.

**"One of the problems they came across with mercury was that it's a 'natural' material. It's part of most rock formations and it can be detected in the atmosphere in very minute quantities."**

— D.M. Young

The wisdom of Dow's conclusion, that nature's remedial program was the best, has been amply confirmed by subsequent fish analyses. The Ontario Ministry of the Environment has carried out extensive sampling and analysis of Lake St. Clair fish every year since 1970 and has developed a most comprehensive collection of data for a variety of species and sizes of fish. From these results, statistically meaningful conclusions can be drawn.

The results show a general decline in mercury levels in all species, far more dramatic than the most optimistic predictions made in 1970. Further, the Ministry predicted when fish of average length will have mercury levels below 0.5 ppm as follows:

Average Lengths of Fish (1976) And The Estimated Year By Which the Geometric Mean Mercury Level Of These Fish Will Be Below 0.5 ppm.

Species	Mean Length (cm)	Year
Carp	54	1977
Pike	68	1983
Rock Bass	21	1978
Smallmouth Bass	35	1979
Walleye	47	1978
White Bass	32	1979
Yellow Perch	22	1974

**"In ocean fish, researchers have found selenium, which has a blunting effect against mercury. It's nature's built-in antidote."**

— D.M. Young

The Ministry's report attributes the steady decline in mercury levels in fish to the stringent controls placed by Environment Ontario on Dow Canada's chloralkali plant in 1970 and the subsequent shutdown of the mercury process at that plant. □

<sup>3</sup>Before the fish crisis of 1970, Dow's principal concern had been the health of its workers, so the monitoring of mercury in workers' urine was an important component of our industrial hygiene program.





Looking south from where Lake Huron flows into the St. Clair River, with the Bluewater Bridge in the foreground, the main traffic artery between Sarnia, Ontario (left bank) and Port Huron, Michigan. Canada's chemical valley is about five miles downriver from this point. Today, sport fishermen consistently catch five-to-fifteen-pound salmon, pickerel and trout from these waters. Marinas on both the U.S. and Canadian sides cater to more than 6,000 pleasure boaters. One in Sarnia has 650 slips, the second largest such operation in Canada.



# Mankind's 2300-year problem with mercury

An interesting sidelight to the story of mercury as a pollutant is one that only in recent years has come to the fore: the fact that mercury is a substance found throughout nature. It has, in fact, been found wherever it has been sought in the lithosphere, hydrosphere, biosphere and atmosphere.

Prospectors have long known about it because it always occurs with copper and zinc.

To the man in the street, mercury is something used in thermometers and teeth fillings. How can it be poisonous? The answer is, it depends on what form the mercury is in and how it gets into the body. For example, swallowing metallic mercury from a broken thermometer would be harmless, but inhaling its vapor can be a serious health hazard. Mercury compounds also vary greatly in toxicity. Mercurous chloride, better known as calomel, is taken internally as a laxative, yet its close relative, mercuric chloride, is a poison.

Mankind's association with mercury dates back some 2300 years. It was mentioned by Aristotle and was used in early medicine and metallurgy. Hippocrates, the Greek father of medicine, is believed to have used mercury sulphide in the form of suppositories. It occurs in nature as cinnabar (mercuric sulphur), an ore widely distributed throughout the world.

Chinese alchemists of the 2nd Century are said to have looked to mercury for the secrets to longevity and immortality. In the 4th Century, one Chinese alchemist wrote that mercury, among other things, would ward off evil spirits. It is the only element existing as a liquid at normal temperatures.

The largest and richest concentrated deposit of mercury, at Almaden in central Spain, has been worked since the days of the ancient Romans. Until the outbreak of World War II, Spain and

Italy had a virtual monopoly on mercury.

Mercury has had a long association with medicine. For almost 500 years, beginning in the late 15th Century it was the most popular treatment for syphilis in Europe, although by the 17th Century there was some strong opposition to such use. The preferred method of treatment was with the use of a sweat box or barrel containing mercuric sulphide, the patient sitting in the container while heat was applied. There is considerable doubt that the treatment did any good, in fact it has been suggested that it was a colossal hoax.

Mercury was used to treat many other ailments, such as consumption, dropsy, epilepsy, yellow fever, nervous disorders, gastrodynia (bellyache), ulcers and tumors, and several diseases of the heart, and at times was regarded as a panacea, not only in Europe but in America. But, as far back as 1473 an Augsburg physician warned about the vapors of mercury and other metals, advising that work with them, as much as possible, should be done in the open air.

Because of its universality, it is not uncommon to find mercury in fish taken from the remote lakes of Canada's north or in Finland, hundreds of miles from the nearest man or industrial plant. And this was the source of a problem when Canadian federal authorities sought to establish a safe level for ingesting mercury. What is normally done with a toxic material is to take the lowest level at which people will notice ill effects and divide that level by a hundred to provide a good margin of safety. But when they tried to do this with mercury, they came up with a level much lower than the average of 0.2 parts per million found in fish naturally. In other words, to enforce such a level would eliminate all fish from our diet, whether fresh-water or salt-water fish, because they all have mercury — particularly the larger predators which accumulate and con-

centrate the small quantities lodged in the smaller fish they eat.

Both federal and Ontario authorities, therefore, set a somewhat arbitrary figure of 0.5 ppm as a safe level for mercury in fish, a level that was at the time the lowest amount detectable by the comparatively crude system in use a decade ago. Later, although a new system of detection developed in Dow's Analytical Laboratory by Donald Peterson and James Coleman permits measurement down to 0.001 ppm, the 0.5 figure has been found to be reasonable and so today remains the officially safe maximum.

The question that arises is this: If eating fish with high levels of mercury is toxic to us, why is this amount of concentration not toxic to fish themselves? Because: The fish have built up these concentrations in minute quantities over a long time period, which does no harm. But when we eat a fish — particularly a large one towards the end of the food chain — we receive a relatively large dosage of mercury all at once. Also, nature has built in some safety valves during the eons of time it has had to contend with mercury. In ocean fish, for example, it has been found that selenium always exists along with mercury and that it serves to blunt its effect.

The possibility that mercury in the environment might be converted by bacteria to the highly toxic methyl mercury was originally suggested by a Japanese scientist investigating the Minamata outbreak of mercury poisoning in the early fifties. This speculation was discounted when methyl mercury was traced to industrial effluents discharged into Minamata Bay. This idea of "bacterial methylation" was revived some years later by Swedish scientists. In 1968 they published an account of laboratory studies which showed that mercury salts dissolved in water could be methylated by bacteria in river sediments. □



DLAB chairlady  
Audrey Manzer: facts  
replace opinions,  
confrontation is the  
last resort. Back-  
ground, Albro Lake.



## QUALITY OF LIFE

# Public participation without confrontation

Dartmouth City Council found itself astride two horses charging in opposite directions. Their solution worked better than anyone expected.

by Jim Lotz<sup>1</sup>

Dartmouth, Nova Scotia, is an unpretentious city on the east side of Halifax Harbour with a few high rises, a decayed downtown, a bustling industrial park and a way of tackling problems without hysteria or headlines.

What makes it unique among modern cities is the 23 lakes within the city limits. In the early Seventies, as the city

grew, many citizens expressed concern that development was affecting the lakes. In 1961, Dartmouth's population was 47,000; ten years later it was almost 65,000 — and the growth was sideways, not upwards. New suburbs and shopping centres spread to the east of the city, and silt, sand and salt began to wash into the lakes. Natural patterns of drainage were disturbed and watersheds eroded.

Ironically, Dartmouth's growth, a matter of municipal pride, began to damage one of its greatest assets. "Save our lakes" became a rallying cry among concerned citizens. City Council found itself astride two horses — Development and Conservation — charging in opposite directions. According to Kell An-toft, director of Dalhousie University's

Institute of Public Affairs, "The way developers were treating Dartmouth lakes, they were doomed."

## Rising tensions

To handle the rising tensions, the Council established the Dartmouth Lakes Advisory Board in June, 1971. At first its members were lumped in with the "ecofreaks", although the Board's sixteen members included representatives of groups with a direct interest in the lakes (aquatic, rowing, canoe and recreational associations) and of people with scientific and technical knowledge (biologists, physical scientists, lawyers, chemists, teachers). Meetings between the Board and developers were marked by confrontation at first, and by heavy

<sup>1</sup>Mr. Lotz, a Halifax freelance writer, has 18 years' background in the field of community development and public participation. He also worked for five years as a physical scientist. He is the author of *Northern Realities* and *Understanding Canada* and co-author of *Cape Breton Island*. His first murder mystery, *Death in Dawson*, was published this year in paperback. In his spare time, he says, he is working towards a degree in Theology.



reliance on emotions and opinions.

Today, however, seven years after its founding, the Board has established saner standards for public participation in Canada and is being used as a model for a similar proposal for Halifax. This has come about without government grants.

Mrs. Audrey Manzer, chairlady of the Board for six of its seven years, explains how this happened: "Slowly but surely, facts replaced opinions. We learned the hard way, and we learned quickly. We had to build up our credibility among politicians and among citizens. We'd rather handle ten nuisance calls than miss one important one."

The Board has developed a sensitive understanding of both the physical and political ecology of Dartmouth. The members know exactly whom to talk with about what. Once a bulldozer was reported operating in a watershed. A call went out from the Board to City Hall and within minutes the Mayor and the City Clerk were on the scene, ordering the operator to stop.

Mrs. Manzer's phone rings all the time. Some citizens are afraid to talk with government officials, despite her advice to do so. So she'll put in the call. "Government people know who I am and what I do. And I always respect lines of communication," she says.

## Source of advice

Citizens and civil servants tap the



Lake Banook. Just a few blocks from home.

Board for advice. There's pressure on the City to fill a swamp. What should they do? Mrs. Manzer explains: "I'll phone the Board and get their views. That swamp is doing its job, and should be left alone. Man can't build a better filter for water than a swamp. But some people look upon them as nuisances."

By getting feedback from local people and technical knowledge, the Board helps City Council to act and to react to a wide range of public concerns. "For example," say Mrs. Manzer, "City councillors don't have time to read reports and reams of material. We put on our boots, look at the situation on the ground, gather the necessary information and condense it for them in a page or two."

Her involvement with the environ-

ment began when she was growing up in New Brunswick and her doctor father took his family into the woods to teach them to understand and to appreciate the outdoors. Before coming to Dartmouth 12 years ago, the Manzer family lived in Regina and Toronto where her six children would ask: "What do we do this summer?" They no longer have to ask. They swim, skate and canoe on Banook Lake, a few blocks from home, where muskrat and black duck abound. Last April a 14-year-old boy caught a 27-inch, 9.5-pound trout in Penhorn Lake, within the city limits. And a few days later a 30-inch brown trout was landed at Maynard Lake, about half a mile from the city centre.

Audrey Manzer notes a prime attraction of life in Dartmouth: "I can take my canoe and paddle into Micmac Lake and be completely alone on an island in a matter of minutes. You can walk amid woods, lakes and streams within the city limits. It's soul-restoring for people locked up in buildings all day."

## Makes sense all round

The Board points out to developers that if they retain the soil and trees on their lots, it makes sense in business terms as well as environmentally. Nor is Mrs. Manzer hostile to big business, which she says has accepted the Board as a necessary means of bridging the gap between local government and citizens. Dartmouth's Mayor Daniel Brownlow (see box) sees the Board as a

*Continued on page 19*

## Some opinions on DLAB

Dr. J. Ogden Gordon III, Department of Biology, Dalhousie University, Halifax (who has suggested that Halifax should set up a Lakes Advisory Board): "Dartmouth is one of the few cities in North America that still has 'primitive' lakes within its municipal boundaries. This is mainly a consequence of the work of the Dartmouth Lakes Advisory Board, a body that is unique in North America. It's a model for urban environments throughout the continent. It is not anti-development, and it can draw upon a great deal of free, voluntary expertise from a wide range of sources to deal with any problem concerning the lakes."

Tom Swanson, consulting engineer, Alderney Consultants, Dartmouth, who represents the Urban Development Institute of Nova Scotia: "Developers, in general, support the Board. They are voluntarily exceeding the Board's requirements. The Provincial Department of Highways submits its plans to the Board and asks for guidance. Some small developers and contractors, however, feel that the Board's requirements impose a hardship on them and add to their costs."

Dartmouth Mayor Daniel Brownlow: "Some seven years ago Dartmouth City Council approved the formation of the Dartmouth Lakes Advisory Board for the general purpose of advising Council

on all matters relating to lakes and streams within the City, with particular emphasis on the impact development would have on these. Throughout the years, I have been impressed with the calibre of the research that this group of volunteers continues to do. It is without doubt one of the most hard-working Boards which provides Council with excellent information, completely documented, together with sound recommendations and suggestions for Council's consideration.

"This Board has a great deal of credibility in the community and acts, on many occasions, as a liaison with departments in their efforts to provide us with the best possible solutions."





## To get richer you must take chances

"What makes it impossible is the increasing number of restrictions we put upon how the process takes place."

by Jack McArthur <sup>1</sup>

Canadians are demanding the impossible of the governments and industries which make their economy go.

They insist that their living standards rise, accompanied by much less unemployment than the existing 8 per cent-plus. This means they insist that industry become steadily more efficient to yield the higher productivity which alone brings a long-run increase in the standard of living.

It also means the real volume of national production must go up by at least 5 per cent a year, something it hasn't done since 1973.

That's tough enough in these unsettled days. What makes it impossible is the increasing number of restrictions which Canadians, en masse or in groups, want to put upon how the process takes place.

It seems that we mustn't build nuclear power plants until we — and their immediate neighbors — are satisfied the risks to life, health and real estate values are virtually non-existent.

We mustn't have a seal-hunt business because those little seals are so gosh-darned cute.

We mustn't build pulp and paper mills because the few hundred nearby Indians might not like it and because we haven't yet decided what to do about native claims to own whole areas and be responsible for their protection in perpetuity.

We mustn't spray insecticides and other chemicals on crops and trees

because they may have bad side-effects upon birds, fish, animals and humans.

We must preserve vast regions of forest and rock from development because we have a heritage to protect: a few city-dwellers may wish to gaze some day on unspoiled wildernesses.

### Limit development

We must strictly limit new industrial, commercial, transport and housing developments if anyone thinks they will interfere with his enjoyment of life and rising real estate values.

We must prevent many industries from setting up in regions where they can produce and serve markets most efficiently because, all too often, other regions have much higher unemployment and "deserve" to get the new jobs.

We must try to stop companies from selling freely at the best prices for themselves (and their employees' incomes) if those willing to pay the highest prices are foreigners. If Canadians want to pay a lower price, their needs nevertheless must be satisfied first.

We must try to stop Canadian companies from setting up foreign production which might compete with their Canadian production — which is a powerful argument for these companies not to have any Canadian production at all and thus avoid the problem.

When a Canadian producer gets in trouble, we must "save" the jobs by having governments take it over to keep it going, thus perpetuating a high-cost, non-competitive industry through oceans of red ink at great cost to the taxpayer.

Despite these and other costs of the extensive government activity always being demanded, we must have lower taxes.

We must make no big deals with the perfidious Americans, no matter how profitable they may seem, because somehow, some day, they'll work out badly. Besides, they give Americans a say in our affairs.

### They're too efficient

We must give up any thought of competing with the Germans and the Japanese because they're just too efficient. (They're not, of course, on a nation-wide basis. But no matter.)

We must cut off immigration not only of people who are of no obvious value to the economy but, more particularly, of people who are willing to work hard and productively and thus (supposedly) will deprive Canadians of work.

We must have all kinds of sophisticated research and development work because it's nice, clean, highly paid employment. But we can't ask consumers to pay for it through higher prices or taxpayers through higher taxes.

We must have steadily rising incomes yet also keep alive those uncompetitive, labor-intensive industries which can least afford to pay steadily rising wages and salaries.

We must have clear, strong, national economic and industrial policies but the federal government must give up power to the provinces, which have yet to agree that the sun will rise tomorrow, much less anything else.

We must have a simpler, more fair, less complex tax structure but there can be no changes which may cause discomfort to any large group.

Unfortunately, if we agree entirely with these and many other restrictions our dreams of greater growth and real incomes are pipe-dreams. □

<sup>1</sup>The author is a business columnist with the Toronto Star. This article, one of his regular columns, appeared in that paper on Feb. 7th, 1978 and is reprinted through the courtesy of the Star.



# Unruly laws for lawmakers

"I am convinced that the momentum of enlightened self-interest is always better than the compulsion of law."

by Dallin H. Oaks, President, Brigham Young University<sup>1</sup>

One of the most important books of the Twentieth Century is *Parkinson's Law*, a 1957 publication of C. Northcote Parkinson, Raffles Professor of History at the University of Malaya. It is important because it applies common sense to questions of public policy.

Parkinson's first law proclaims that "work expands so as to fill the time available for its completion." This first law has two axioms: (1) "An official wants to multiply subordinates, not rivals," and (2) "Officials make work for each other."

In 1960, Parkinson published another book containing his second law: "Expenditure rises to meet income." The preface declares that this book was intended to show "that a greatly reduced revenue would bring about an improvement, not a decline in the public services." Parkinson explains this astonishing conclusion as follows:

"It is the paradox of administration

that fewer people have less to do and more time, therefore, in which to think about what they are doing. When funds are limitless, the only economy made is thinking. The worst inefficiencies do not stem from a lack of funds but from an initial failure to decide exactly what the object is. It is this muddled thinking that leads to waste, and often to waste on a colossal scale. Toward eliminating public waste, an essential step is to limit the total revenue."

Inspired by Parkinson's wisdom I have sought to apply similar insights to the process of lawmaking and of government administration.

## I. Law expands

I evolved my first law or principle for lawmakers by posing variations on Parkinson's first two laws. If "work expands to fill the time available for its completion," as Parkinson's first law affirms, then this surely implies that as the staff of a department increases, the amount of work accomplished by the average staff member will diminish so that the total work accomplished by the department will not exceed what is necessary to complete its assignment. Similarly, if "expenditures rise to meet income," then it follows that the money bureaucrats save in one direction will surely be wasted in another.

By this process I arrived at my first principle of law-making: *Law expands in proportion to the resources available for its enforcement.* The expanding law referred to in this principle is not limited to the law in the statute books. It includes the regulations of administrative agencies, the rulings of regulatory bodies, and even the individual actions of government servants.

The first principle is verified by the observation that a government's bureaucratic army is never demobilized. If a government agency is created or a government worker is employed to accomplish a task that is later accom-

plished, experience teaches that the public employment rolls will not be reduced. The bureaucratic army will be transferred to another front, and if there are insufficient conflicts to justify their continued mobilization, they will start some.

The process is not easy to counter. It is worse in government because government activities are not disciplined by the constraints of a competitive market place.

Before introducing my second principle I will share three corollaries I have formulated in connection with my work on the first principle.

The first corollary states that *the public is easily fooled by government claims of economizing.* Inefficiency is easy to conceal because governments have no competitors in the performance of their functions. As they say in the nation's capital: "If you're not confused, you're not well informed."

The conventional way to promote economy in government is to hire experts to analyze the problems and recommend solutions, hire others to evaluate the suggestions, hire others to write regulations to implement them, hire others to supervise their enforcement, and hire others — public relations specialists — to praise the results and persuade the public of their success. In fact, there has been an increase in both government regulation and government employment.

As a second corollary I suggest that *an uninformed lawmaker is more likely to produce a complicated law than a simple one.* This hypothesis is grounded in the same truth relied on by the man who apologized for writing a long letter and explained that if he had had more time he would have written a shorter one. If lawmakers understand a problem and agree on their objective, they may be able to express themselves with an elegant simplicity that is sure to be absent if their lawmaking efforts thrash about in ignorance and discord.

My third corollary is that *bad or complicated law tends to drive out good judgment.*

Bad laws — especially complicated bad laws — can cause administrators to be so preoccupied with whether something is legal that they wholly neglect to consider whether it is wise. Some years ago I was asked to advise on a complicated reorganization of business activities. There were two objections to the pro-



DALLIN H. OAKS

<sup>1</sup> This article is an edited version, with the author's permission, of a speech Dallin H. Oaks made in January, 1978, at Colorado Springs, Colorado. His complete text appeared in *Vital Speeches of the Day* (Vol. XLIV, p. 296) and in the *Congressional Record* (Mar. 17/78, p. S-4021).

Mr. Oaks holds a B.A. in accounting, a Doctor of Law degree, cum laude, and was named to the highest legal scholarship society — the Order of the Coif (pronounced "coy-f"). His career embraces stints as a corporation lawyer, a law professor, executive director of the American Bar Foundation, a criminal defense counsel, counsel for various government bodies, and as editor-in-chief of *The University of Chicago Law Review*. He has authored five books dealing with the subjects of church and state, trust law, criminal procedure, legal profession, and legal history.



# Oaks' Laws for Lawmakers (and Regulators)

No. 1: Law expands in proportion to the resources available for its enforcement.

*Corollary (a): The public is easily fooled by government claims of economizing.*

*Corollary (b): An uninformed lawmaker is more likely to produce a complicated law than a simple one.*

*Corollary (c): Bad or complicated law tends to drive out good judgment.*

No. 2: A bad law is more likely to be supplemented than repealed.

*Corollary: Elected lawmakers reserve credit and delegate blame.*

No. 3: Social legislation cannot repeal physical laws.

*Corollary: Law cannot increase resources.*

*Dallin H. Oaks  
President, Brigham Young University*

posed reorganization: it was unwise as a matter of business judgment, and it might bring unfavorable tax effects. Unfortunately, the responsible administrators became so preoccupied with the complexities and challenges of the tax law that they came to see this as the only question. When they received a favorable tax ruling, they treated that victory as having satisfied all doubts. They rushed into a business reorganization

they would never have considered if they had not let bad law displace good business judgment. The lesson to be drawn from this experience is that a task not worth doing at all is not worth doing well.

## II. Supplementing bad law

Oaks' second law for lawmakers is that *a bad law is more likely to be supplemented than repealed.*

For example, consider the minimum wage. An employer who will hire a marginal worker at \$1.50 an hour, will not hire him at \$2.65. The employer will try to economize by mechanization or other means, which will increase unemployment among many of the workers the minimum wage law purports to protect. But the favorable political effects of minimum wage laws generally prevail over their unfavorable econo-



mic effects.

Instead of being repealed, the bad minimum wage law is supplemented by unemployment and welfare legislation.

This second principle has also produced a corollary which suggests a vital defect in a representative democracy that is increasingly relying on government by agency decree: *elected lawmakers reserve credit and delegate blame.*

When a law is hailed as a great accomplishment, elected lawmakers are resolute about shouldering responsibility for the accomplishment. But the blame for bad laws is generally delegated to the bureaucrats who wrote the regulations. If a lawmaker gets a letter from a *voter*, he answers it; if he gets a complaint from a *taxpayer*, he refers it to an agency.

By writing vague and relatively meaningless laws, in effect delegating the lawmaking function (to bureaucrats), an elected lawmaker can escape having to vote on hard questions like the definition of "handicapped", the exceptions to be made to a law outlawing age discrimination, or who shall be subject to a law outlawing sex discrimination. Those vital lawmaking decisions are left to bureaucrats who rule by decree, largely in secret, and without responsibility to the electorate.

### III. Legislating nature

The third of my three laws for lawmakers is: *Social legislation cannot repeal physical laws.* This deceptively simple principle cannot be taken for granted since so many persons apparently disbelieve it, or act as if they do. People are generally all too susceptible to gimmicks, like the energy conservation measure of the dowager who only plugged in her electric clock when she wanted to know what time it was.

In the area of social welfare legislation, my third law is clearly illustrated by its primary corollary: *Law cannot increase resources.* Government can pass a law freezing wages and prices or devaluing currency, but it cannot pass a law that will bring about an increase in the nation's true gross national product.

Social planners cannot be reminded too often that an overall growth in the economy is a sounder means of abolishing poverty than a redistribution of capital or income. The sum total of all resources in the hands of the wealthiest fraction of taxpayers in this country would be insufficient to make any practical dent on poverty even if all of those resources were confiscated and given to the poor.

The taxes necessary to support social welfare programs obviously have to come from the working middle class.

But, as the working man's taxes go higher and higher, and as generally available social welfare payments get more and more generous, a worker has less and less incentive to work. Even the British Labour Government was brought to that conclusion. It made more sense for the average British worker to stay home and collect unemployment pay than to work and pay taxes.

In my exposition of these laws I obviously have made no effort to conceal my bias against law-making as the solution to every problem. I am not indifferent toward the abundant problems of our society, but only convinced that voluntary is always better than compelled — that the momentum of enlightened self-interest is always better than the compulsion of law. Inherent in our free enterprise system are the natural forces to correct most of its internal irregularities, although these correctives are sometimes slow and unpopular.

But free enterprise has no corrective for excessive interference from government. It can only tolerate that interference and pass its cost along to consumers. In time, that cost can rise so high that our people may reject free enterprise because of grievances that should be charged to excessive government interference. □

## Public participation without confrontation *Continued from page 15*



Micmac Boat Club: soul-restoring recreation facilities within the city limits.

valuable aid to the political process.

"Confrontation is the last resort," says Mrs. Manzer. "When a problem arises, we get the facts, sit down around the table

and decide how to deal with it. But if someone is doing something foul, we'll contact the media."

About 40 people have served on the

Board since its inception. Bernie Hart, Director of Media Services for the Nova Scotia Department of Education, has been the backbone of the Board from the beginning. He has provided expert advice and skills to the voluntary group, developing simple kits to help teachers to explain the Dartmouth lake system to students.

A typical project took place in 1973 when the Board organized a water-quality study of Lakes Banook and Micmac. Donald C. Gordon, Jr., of the Marine Ecology Laboratory, headed the study and estimated that he spent 500 hours on it. The City bought testing equipment, teenagers took samples, the Banook Canoe Club provided a launch, and two federal agencies — the Environmental Protection Service and the Bedford Institute of Oceanography — tested the samples.

### DLAB has no budget

The Board meets once a month and

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## Watching the watcher watch the watchers

by Fergus Cronin <sup>1</sup>



The distinguished-looking, grey-haired man with the heavy eyebrows looked like anything but the former Anglican Dean of Edmonton as he addressed the Ontario Section of the Canadian Bar Association at their mid-winter meeting in London, Ont. He more closely resembled a corporation lawyer addressing the Supreme Court of Canada as he propounded: "Whether government department, police, security force or ombudsman, someone *must* watch the watchers."

Then he added the words that travelled right across the country and resulted in dozens of news stories and angry editorials: "The only exception in our society appears to be the media, which at times take more than poetic licence in their self-appointed role as watchers of everyone."

The speaker was Dr. Randall Ivany, who was indeed the former Anglican Dean of Edmonton, and before that an electrical engineer with a Canadian

electronics firm. He was now well into his third career as ombudsman for the province of Alberta, a position he took over in 1974.

Coverage of his address to the Ontario lawyers was further proof to Dr. Ivany that the news media are inclined to skim the sensational off the top of a story and ignore the rest. The five paragraphs sent around the country by the Canadian Press news agency made reference only to his criticism of the way the press had handled its criticism of the RCMP.

"There were at least 12 other major items, including my philosophy of the office of ombudsman, but these went unnoticed," he complained.

"It is of no small concern to me," he said in London in February, "that some of the reporting, and indeed some of the statements made by politicians in recent times concerning the alleged illegal activities of the RCMP Security Service, has exceeded the bounds of all decency. Its demoralizing effect on members of a national police force, who could not yet defend themselves, may not be fully calculated for years to come."

And that was all he had to say about the media in his 12-minute address. One editorial picked up his comment about the media being "self-appointed" watcher of everyone, suggesting that Dr. Ivany was attacking the concept of a free press, which of course he was not.

"To a real extent," he said later, "the media are a watcher of the ombudsman. I'm answerable to the Alberta legislature, and make a yearly report, but to some extent I'm accountable to the public through the media. However, I have some differences over what they pick up."

"I am concerned," says Dr. Ivany, "that the media usually take up the most sensational aspect of any given story. I mentioned this once in Ottawa and I was told the only remedy was to buy a bigger newspaper, which of course is easier said than done."

"But I also listen to the public, and the image of the media is not that good. The public seems to feel that they are not too accurate. The media, of course, should know what constitutes news, but

<sup>1</sup>Fergus Cronin is a Toronto freelance writer and former Time Canada correspondent.



you wonder sometimes when you see them reporting the blood and guts of war, and when you see the violent news on the air.

"Maybe they know this is what the public wants. But I'm not at all convinced the public is getting entirely what it wants or what it should have. One must have freedom of the press, but I wonder if it's not a post-Watergate syndrome which tends to dig into things and raise some issues that are not entirely in the public interest.

"We get the Globe and Mail every morning, for example. It's probably the classic newspaper in Canada — I get news there of Alberta that I don't see elsewhere." His exposure to the media is really nation-wide and "there is every reason for them to have critics. But I get the impression they don't want to be criticized. They're overly sensitive. But I think they will be more and more criticized, and not just in letters to the editors. If they misquote or distort, I'm going to tell them.

"That's not to say I don't have a respect for the press. I do. I have a great respect.

And I'm not mad at them. But I say there needs to be a slightly different emphasis, away from sensation. We need more accuracy, and when there is not, we have to go back and tell them so, and I must say I've found them eminently fair when I needed a correction. But people are afraid to criticize the press."

Perhaps, said Dr. Ivany, there should be an ombudsman for the media. This he pointed out, is "not entirely unheard of" because Judy LaMarsh recommended one a year ago in her "Report of the Royal Commission on Violence in the Communications Industry." Dr. Ivany quickly produced a copy of the report and pointed to Recommendations No. 46 and 49:

"To ensure watchdog protection for the public and the communications industry under the Freedom of Expression Act, the Commission recommends institution of a National Media Council representing both the communications industry and the public, on a statutory basis, headed by a National Media Ombudsman, to receive and act upon complaints of contravention of the Freedom of Expression Act and to

protect that freedom from attack ... The purpose of the position (of Media Ombudsman) is to protect the principle of free expression in all media and to protect the public from media excesses."

Alberta, Dr. Ivany pointed out, has had a Press Council for about ten years. Two other provinces have them as well, but the majority of newspapers (including some of the biggest) are not members "and that's a major weakness. But here in Alberta it's good. They move quietly, and you see things corrected." Only two or three Canadian newspapers have ombudsmen.

However, a Press Council cannot do the job of an ombudsman. "I would not recommend that a media ombudsman be a government-appointed position, but the media itself should appoint their own watchdog — I wouldn't want the jurisdiction. The government appoints its own. Insurance companies appoint their own, and so do universities. If the media appoint a complaint-handling mechanism themselves, there could be no suspicion of muzzling the press."

And so Dr. Ivany rests his case — but not his restless demand for fair play. □



### **Noteworthy appointments**

Etcyl H. Blair to vice president of Health and Environmental Sciences of The Dow Chemical Company. His former position as director of Health and Environmental Research for Dow Chemical U.S.A. is held by Perry J. Gehring, who was promoted from director of the Dow U.S.A. Toxicology Laboratory in Midland, Michigan. V.K. Rowe, director of Toxicological Affairs in Health and Environmental Research, Dow Chemical U.S.A., has been named a Research Fellow. He joins three other Dow scientists ever given this highest Dow title for researchers.

### **Neely selected SOCMA Gold Medal winner**

W. Brock Neely, Dow U.S.A. associate scientist, was recently named the 1978 SOCMA Gold Medal Award winner. The Medal and a \$1,000 honorarium are given to an individual annually by the Synthetic Organic Chemical Manufacturers Association (SOCMA) in recognition of outstanding accomplishments in the application of environmental organic chemistry. Neely was honored for his work on the bioconcentration of organic compounds when distributed in the environment, as well as for pioneering research into how living organisms clear potentially dangerous compounds from their tissues.

### **U.I. programs increase global unemployment rate**

A book recently released by the Fraser Institute, Vancouver, reveals that Canada is not alone in experiencing difficulty with unemployment insurance programs. A 400-page study of 10 countries and 100 years of experience with support programs for the unemployed demonstrates conclusively that increased unemployment insurance benefits invariably induce more people to be unemployed. Titled "Unemployment Insurance: Global Evidence of its Effect on Unemployment", the book suggests that Canada's 1971 liberalization of the Unemployment Insurance Act may have increased unemployment by as much as 26% above what it would have been.

### **CBC challenged on reporting balance, accuracy**

A number of member companies of the Grocery Products Manufacturers of Canada have formed a "Committee for Improved Business Reporting." The group intends to emphasize the need for better balanced and more factual reporting of business news in Canada. In a recent brief before the Canadian Radio, Television

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## Public participation without confrontation *Continued from page 19*

has no budget. City Hall provides secretarial and duplicating facilities, typing and distributing minutes and reports. The Board actually provides a first rate consulting service in the City at no cost. Local people were skeptical when a representative of the Urban Development Institute of Nova Scotia was appointed to the Board. But Tom Swanson, a consulting engineer, brought with him another set of skills and perspectives and provides background and technical information that helps Board members to understand the developer's point of view.

Earlier this year, Dartmouth City Council rejected an application for an apartment building. The Board had shown that construction would damage the environment beyond acceptable limits. About the same time, the Board

received the award of the Nova Scotia Department of the Environment for the length and consistency of its efforts to preserve and enhance the environment. The Board was in operation before the Department was, and its credibility derives from the fact that it has faithfully followed its terms of reference, resisting the lure of headline and crisis-hunting.

There have been times of despair, Mrs. Manzer recalls, when the Board wondered what it was achieving. "But we asked ourselves: What would things have been like if we hadn't made the effort? And the question seems to provide the answer about our role."

She has noted a decline in volunteer activities in recent years, and she is concerned about the bitterness and cynicism shown by members of environ-

ment groups that focused on issues and have taken an adversary stance towards government and industry. In contrast, the Board has complemented the work of the Dartmouth City Council rather than opposing or rubber-stamping it. The Council has now set up similar advisory boards for recreation and community services, modelled on the DLAB.

"Some developers were irritated by DLAB at first," says Mr. Antoft, "but even they now recognize that basically it was a good thing to save the lakes. There is no dispute now that it has been successful. And the Board will continue to play a role because there remains a lot of open land further out. There is a continued need to ensure that the shores of the lakes don't get cluttered with undesirable buildings." □

## Bulletin board

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*and Telecommunications Commission in connection with the CBC's application for renewal of its license, the Committee provided specific examples of bias and inaccuracies in CBC-TV public affairs reports concerning such companies as Noranda Mines, McCain Foods, Texaco Canada, Inco, Burns Foods, and the Canadian sugar industry. Others have also documented examples of "misleading and inaccurate" television coverage, such as the Canadian Agricultural Chemicals Association and the Canadian Chemical Producers Association. However, none have so far succeeded in getting any corrections aired by CBC.*

*Meanwhile, Agriculture Canada has reported it found no diethylstilbestrol (DES) residues in beef liver samples which the CBC had reported were contaminated with the growth promoting hormone. The network said a private laboratory had found DES in 9 out of 10 samples of Canadian and U.S. beef liver purchased in Toronto stores. The CBC said levels as high as 1.94 parts per million (ppm) were found in the Canadian liver and as much as 3.72 ppm in the U.S. liver. Whereupon Agriculture Canada obtained samples of the livers tested by the private laboratory and ran thorough tests on them at its animal pathology laboratory in Guelph, Ont. No detectable DES residues whatsoever were found in any of the samples.*

## Breakthrough in coal liquefaction technology

*A new coal liquefaction process developed by Dow makes it possible to produce low sulfur fuel oil and chemical feedstocks from this plentiful and inexpensive material. The process could lead to commercial coal liquefaction by 1990 but, because of the high costs involved in furthering this research project, cooperation between government and industry is needed, says M.E. Pruitt, corporate vice president and director of Research for The Dow Chemical Company.*

## Four Industrial Research awards to Dow

*Dow Chemical U.S.A. has won awards for developing four of the 100 most significant new technical products of the year in the annual "I-R 100" competition, sponsored by Industrial Research magazine of Chicago. This brings to 23 the total number won by Dow since inception of the "I-R 100" awards in 1962. The Dow winners were (a) 2-ethyl-2-oxazoline versatile chemical building block; (b) a waste solidification process for disposal of low-level atomic wastes; (c) a freeze conditioning agent for facilitating the handling of frozen coal in rail cars; and (d) a new family of polyethylene resins with exceptional film strength properties, high impact strength and environmental stress crack resistance in molded parts. □*



# Stewardship - a new use for an old word

At Dow we know what we mean by "stewardship" but, because we thought others might not know, we looked it up. Our desk dictionary described it as "the office or duties of a steward" and "steward" as, among other things, "one who controls financial affairs." Another dictionary — the Oxford — carries almost a full column on the word "steward" running through at least a dozen meanings, none of them helpful.

We had an ace in the hole that has worked before — a broken-backed copy of Webster's International Dictionary, dated 1908. It has taken us back on previous occasions to first principles. But it too let us down. Surely we hadn't been using the term "stewardship" wrong all these years.

A 1960 edition of the Pocket Oxford Dictionary came closer. "Stewardship:" it said, "Charge committed to one ('give an account of one's stewardship')." Finally we resorted to the Public Library where a 1969 edition of Webster's Third New International Dictionary, among other meanings, defined stewardship as: "An aspect of the religious life and church administration dealing with the *individual's responsibility* for sharing systematically and proportionately his time, talent and material possessions in the service of God and for the *benefit of all mankind*" (italics added). It was not exact, but some key words were there.

Probably nobody at Dow can remember how long the idea behind "product stewardship" has been around. Zoltan Merszei, the parent company's board chairman, expressed it simply recently: "Stewardship is absolutely essential in our industry. As a company we must work with many substances which, if not contained and handled properly, can cause great harm to people and to the environment. Our commitment to stewardship will continue as a natural outgrowth of self-regulation (which) has quickened a sense of personal responsibility for the activities of the company."

R.E. Naegele, president of Dow Canada, defined product stewardship as "the control of the hazards involved in the use of our products." He continued: "It is based on our company's knowledge

about these hazards and our continued work on possible hazards to either man or his environment. Equally important is the communication of this knowledge to all users of our products, shippers, and the general public who might come in contact with our products."

A good example of product stewardship occurred in the Davao area of the Philippines where the banana industry has been supplied with Polyethylene D, a film extrusion resin blended with DURSBAN\* insecticide, a Dow product. The film is used to shroud young developing bananas; the DURSBAN\* protects them against insect attack, which could destroy the fruit. However, excessive exposure to DURSBAN\* in the film extrusion process needs to be controlled and Dow standards insist on the monitoring of workers' health with several tests.

But there was no one in the Davao area with the equipment or the expertise to make the tests. So Dow found an interested and capable Filipino doctor, Dr. Asuncion Paraan, installed the equipment in her clinic, taught her how to run the tests and also helped to train technicians. Dow also worked with owners of film extruding operations, convincing one to move his plant to reduce the possibility of exposure to nearby residents. Another film extrusion plant owner was assisted in redesigning his system, moving vents from a wall to the roof of his factory.

Much closer to home we have the story about mercury in the St. Clair River, covered elsewhere in this issue. As attested by Ontario's attorney general, Dow went further and faster than required by regulations to reduce, then to eliminate altogether the discharge of mercury to the river. The fact that this was conceded by the leader of the Opposition in the Ontario Legislature is convincing. Furthermore, the highly sensitive analytical methods developed by Dow to detect and measure very small amounts of mercury have become the standard throughout the chloralkali industry and in scientific circles.

It's not all altruism. Paul F. Oreffice, new president of the parent company, displayed the other side of the coin: "Aside from our primary motivation for

adopting a product stewardship program," he said, "is the fact that if we do this job better than our competitors, it will be recognized in the marketplace, and in the longer run in our profitability ... Our leadership task in this area is not an easy one to maintain at times. But nevertheless, we are committed to it."

The chemical business is capital intensive. It is important that Dow be able to sell the products of these plants over a long time so that it can recover its huge investment and show a profit (for ultimate distribution to thousands of shareholders and re-investment in new environmentally-safe plant facilities). Any misuse of our products that may shorten this time period through regulation or prohibition is important to us. Thus we have worked carefully with old and new customers to eliminate misuse. We have actually refused to sell products where there was a risk of misuse or poor control of potential hazards. We continually monitor our customers and they have all responded because their interest in establishing this control is as great as ours.

Thus product stewardship is a commercially justifiable responsibility, both in short-term marketing and for the long term health of our business. And there it is: the profit motive — the free-enterprise system that has somehow fallen into disrepute in recent years. But that same system, imperfect as it is, has helped us build one of the most affluent societies the world has ever known. A responsible free-enterprise system, based on the inalienable freedom of individuals in the private sector to create wealth, has proven to be a better deal overall for mankind than socialistic systems that insidiously erode all fundamental freedoms to the point of total state servitude.

As we put away our several dictionaries we reflected that the great lexicographers might have raised their eyebrows. For what we had done was not to consult their works to find a meaning, but to keep consulting them until we found the meaning we wanted — almost like choosing your history to fit your prejudices.

Perhaps we have practiced and hence interpreted product stewardship in a new way. Let Noah Webster and his successors take note.

D.R. Stephenson